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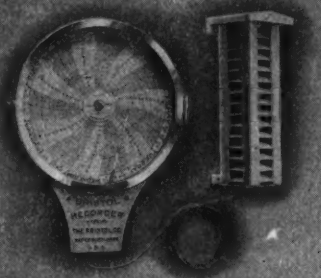
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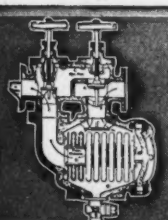
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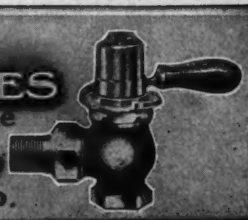

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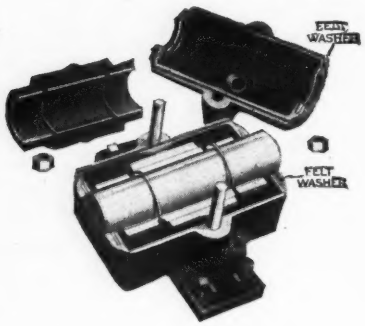

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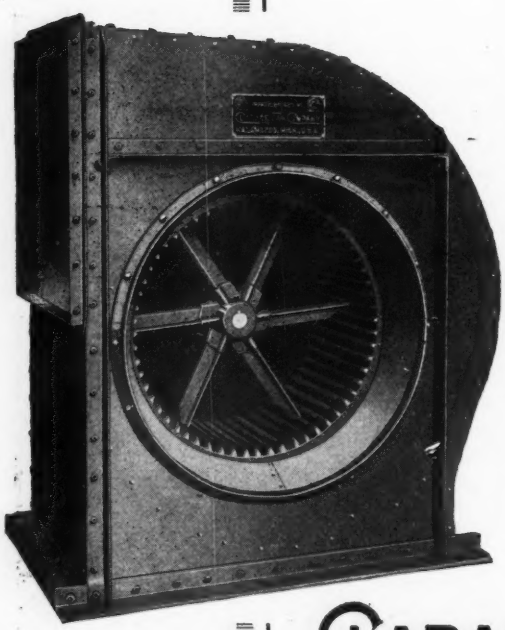

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THE HEATING AND VENTILATING MAGAZINE

Cooperstown, N. Y. MAY, 1918 1123 Broadway, New York

Modern Practice in Vapor Heating

Approved Methods and Devices for Installing and Operating this Type of System.

I.

By HAROLD L. ALT.

The subject of heating has so much variety, so many points of interest, and involves so much detail that few heating men are thorough masters of the craft. This is not said with any desire to reflect upon the average designer, but on the contrary it is an entirely natural result, since a busy man seldom has the time to devote to any subject, however important it may be, the amount of attention he would like to give. In the olden days a plain system of gravity steam heating served almost every purpose and there was little cause for the refinement, economy and flexibility which is demanded at the present time; nowadays so many varieties of steam heating are in existence, both patented and unpatented, that it is hard even to completely list them.

Hot-water heating may be counted as partly responsible for this, since it is the hot-water system which has forcibly brought to notice the desirability of varying the amount of heat obtained from a radiator and the improved results attained where the heat is regulated to meet the requirements of the outside temperature rather than being either all on, or all off, as was naturally the case with the common gravity steam system.

It is generally acknowledged that vapor or vacuum-vapor heating possesses certain merits, in fact, almost all of the merits which can be urged for hot-water, and at the same time does not possess the objections which are often cited as detrimental to hot-water systems. This method of steam heating also compares favorably both in economy and cost of installation with hot-water. It responds quickly to increased or decreased draft, i. e., (it is easy to control) and possesses no large body of water which must be cooled or warmed *in toto* before a variation in the quantity of heat is obtained. During unseasonable warm days this system can be shut down and the radiators carried absolutely cold until such time as the outside temperature requirements may necessitate a re-opening of the drafts, and it absolutely avoids the danger of leaks from automatic air valves, which is an item of considerable importance.

DIFFERENT DESIGNATIONS OF SYSTEM, BUT SAME PRINCIPLE

This system is variously known as the "vapor," "vapor-vacuum," "modulated" "atmospheric" or "thermograde" system. While a vacuum may be obtained at times it is not essentially a vacuum system, owing to the fact that a positive pressure is usually

carried on the boiler. In spite of this the return line never rises in pressure above the surrounding atmosphere, due to the fact that the return line itself is actually open to the atmosphere and, therefore, it cannot have any pressure generated therein. This naturally leads to the heart of the matter by suggesting the query, "How can there be a pressure in the boiler without a pressure on the return line?"

This is caused by the head of water which is maintained in the return. For instance, if there is a steam pressure of 1 lb. per square inch of steam in the boiler there is a pressure of 1 lb. per square inch tending to force the water out through the return and back into the system. This is what actually happens so that in order to arrange a system to carry 3 lbs. steam pressure the lowest part of the return where the air vent is taken off and also the lowest radiation must be not less than a good 7 ft. 6 in. above the normal water-line to allow for producing the required head when the allowable steam pressure is generated. Then, when 3 lbs. is raised in the boiler, the return backs up until a head is produced which exerts a 3-lb. pressure above the normal water-line, thus counterbalancing the boiler pressure, this point being approximately 7 ft. above the normal water-line.

PRINCIPLES OF OPERATION

Referring to Fig. 1, the operation of this system may be followed in detail. In this figure the boiler B supplies steam to the steam main SM, this main supplying the steam risers S which may be either up-feed or down-feed, the radiators R shown being supplied by an up-feed system. The steam follows up the various risers to the graduated valves V on the radiators, these valves being the same as used on an ordinary vacuum system and having graduated control (so that certain portions of the radiator may be heated) such as ¼, ½, ¾ and full, as shown in plan and elevation, Fig. 2. The steam enters the radiator through these valves and heats the proportion of surface approximately as indicated on the dial over which the pointer is placed.

To enable the steam to enter the radiator it is necessary for it to force a certain amount of air out of the radiator, all of this air passing out through the return, there being no air valves on this system. Therefore, the return valves T are what are known as "air and water-relief" valves, as shown in Fig. 3, being identical with the return valves used for radiators on strictly vacuum systems. In fact, any sort of a trap passing both air and water may be used for this purpose.

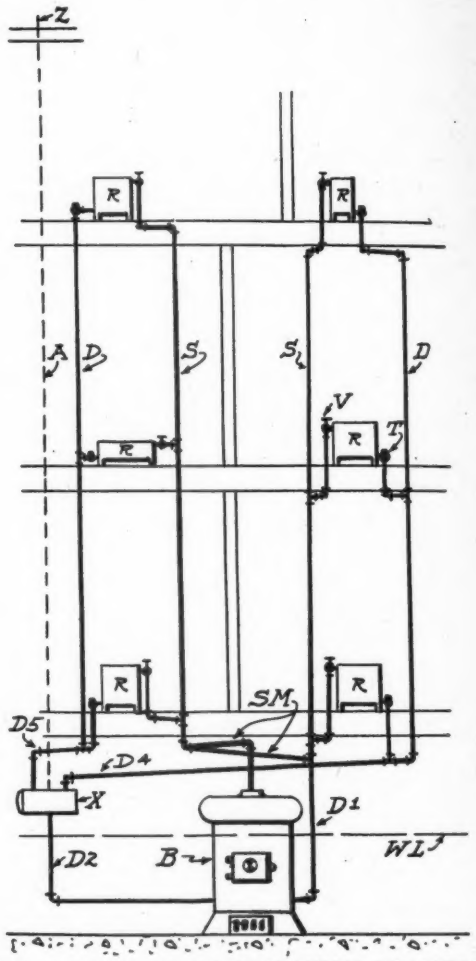


FIG. 1—DIAGRAM OF OPERATION OF VAPOR-HEATING SYSTEM.

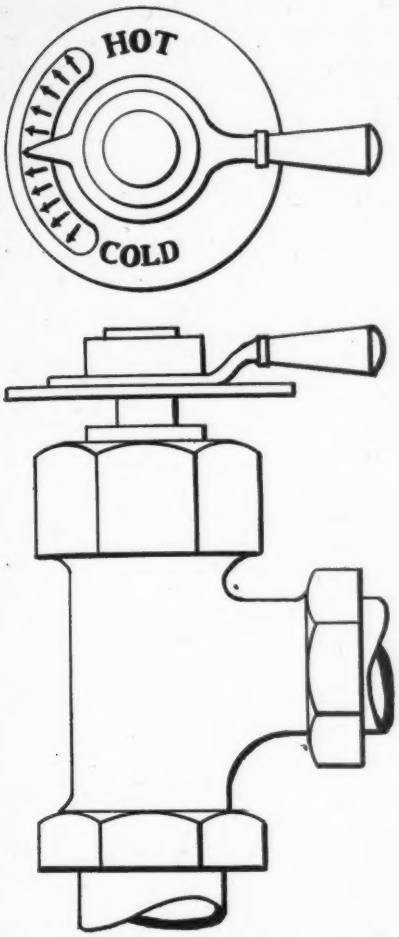


FIG. 2—TYPICAL DESIGN OF RADIATOR VALVE FOR VAPOR HEATING SYSTEM.

TYPES OF VALVES USED ON RADIATORS

These valves are of two separate and distinct types, one operated thermostatically and the other having a float mechanism. The thermostatic type is made in two forms, the older style having some material (with a high expansion coefficient) which expands when heated and closes the return valve in just the same manner as the modern automatic air valve closes when the steam strikes it.

Referring to the float or "water-seal" valve, in one type the air rises in the annular space around the float and follows down the space around the stem into the return. This path is open at all times except when the water enters the trap or rises a sufficient amount to raise the float. At this time a plate on the tube through the center of the float raises a valve against the air outlet into the top and also raises a valve off the seat in the bottom, thus permitting the water to flow out. After the water is relieved the float again assumes the lower position.

Another return valve for radiator use is of the "sylphon" type in which the common and well-known sylphon bellows displaces the expansion member used on the plain thermostatic valve.

These valves remain open, for the passage of air at least, until steam strikes them at which time they close to the steam and remain closed, allowing only the air and water to pass through into the return lines D. The air and water follow down these returns, ultimately being collected by the return mains D4 and D5 in the basement. This main is carried as high as possible since its height, together with that of the air relief pipe and the radiation, determine absolutely the pressure which can be carried on the boiler, as previously explained.

The air and water flow along this return main and into the tank X where the air relief line A leaves the top of

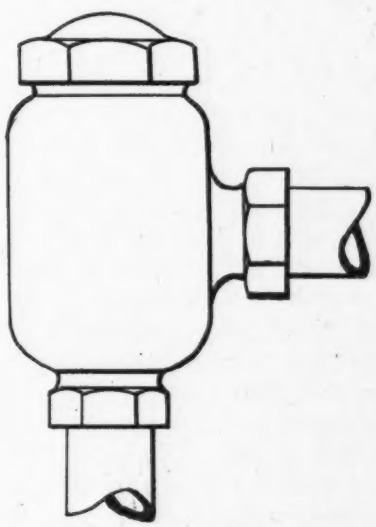


FIG. 3—TYPICAL "AIR AND WATER RELIEF" VALVE.

the return tank X, this permitting the air to escape when it is caught between the return water and the water in the vertical boiler return pipe D2. The air passes out through the vent pipe A which is carried through the roof at Z or to the atmosphere at some other convenient point. The condensation water then passes down through the boiler return pipe D2 and enters the boiler B.

Where necessary to drip steam mains or low points of steam pipes on the radiator side of the return valve, drip lines must be installed and, in order to avoid a multiplicity of return valves, these drips are all connected into a horizontal line in the basement which is drained by a drip valve which discharges the water into the drip return D4 or D5 or with the boiler return D2. Since the air finds its outlet entirely through the radiators it is not essential that the drip return be above the water line, as the flooding of this pipe does not interfere with the air relief in the system or with the returning of the drip to the boiler.

DRIP VALVES ON MAINS MUST BE OF WATER-SEAL TYPE.

Particular attention is called to the fact that a drip valve on the main cannot be used satisfactorily unless of the "water-seal" type, owing to the steam drip being so hot as to seriously affect the operation of a thermostatic trap. If it is desired to use syphon traps throughout it is necessary to connect the steam drip to the trap through a water-seal leg about 24-in. deep to prevent the high temperature water interfering with the thermostatic action.

Some firms which have made a specialty of this class of work maintain that an air-separating tank should be used to give the best results connected up in the manner shown in Fig. 1, as this avoids the danger of carrying any part of the return water up into the vent pipe as might possibly happen when only pipe connections are used. Others use simply a tee with the return coming into the branch, the air line off the top and the boiler returns out of the bottom.

ADVANTAGE OF USING WATER TYPE OF RADIATORS

A typical radiator connection is shown in Fig. 4 and it will be noted that the radiators are of the water type, with a

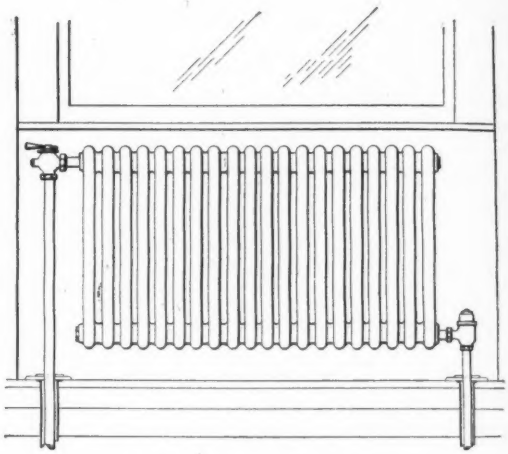


FIG. 4—TYPICAL RADIATOR CONNECTIONS FOR VAPOR HEATING.

top connection on the supply side. This is not absolutely necessary but with leg radiators it is an advantage, making the graduated valves V more accessible than if they were located at the bottom of the radiator, as is customary with ordinary gravity steam systems.

On the other hand, with a wall radiator it would be inconvenient to have the valve at the top of the radiator owing to the difficulty of reaching same when the radiator is 5 ft. or more above the floor. For this reason the valve is located on the wall at hand height but the top connection is used to allow flexibility of connection between the radiator and the riser. It would be entirely practicable in this case to use a bottom connection when it is possible to get a swing joint or other flexible type of pipe connection between the radiator and the riser with the supply in this location.

STEAM TYPE OF RADIATOR USED WITH THERMOSTATIC CONTROL

Where thermostatic control is employed the hot-water type, of radiator with the top inlet and bottom outlet, is abandoned and the regular steam type is used. The supply and return valves are common diaphragm-operated globe valves which are controlled by *positive*-action thermostats.

TRAPPING OF DRIP LINE

It is desired to call attention again to the matter of the drip line and the trapping of same. It is not required to use a trap in this location at all provided a sufficient depth of waterseal can be obtained; that is to say, if it is expected to run this system on a maximum pressure of 1 lb., a water-seal of 2½ ft. would be ample to prevent steam blowing into the return and then out through the air vent. Owing to the liability, however, of excessive pressure being used by accident at times, it is believed to be much better to practice to employ a trap.

OPERATION OF SYSTEM ON A PARTIAL VACUUM.

Another advantage possessed by this system is its ability to be run as a partial vacuum if so desired; the only change required to make this feasible is the placing of a check-valve in the air-relief pipe so that air once blown out of the system cannot come back again upon the production of a partial vacuum within the system. This check valve should be of the type commonly known as an "impulse" check which is made largely on the same style as the ordinary check but which has the tongue suspended on an angle of approximately 60°, instead of 45°, making the operation of the check exert much less back pressure on the system than when the ordinary type is employed. Of course it is desirable to facilitate air relief in every way possible and on this account the impulse check should be given the preference over the common type.

Where this system is installed radiators set under window seats or in recesses can be controlled by carrying the extended valve spindle up through the grille either on the top or on the side—which, of course, means that in this case the valve itself must be turned on its side; these graduated valves work with equal facility either way.

For coils on the ceilings, walls, or other inaccessible places chain wheels are mounted on the graduated valves and carried down to corresponding chain wheels with indicating dials located at a convenient point on the wall.

If it should prove desirable at any time to raise the steam pressure over that originally contemplated and permitted, or if the vertical head obtainable is very small, a trap may be used which will allow a boiler pressure of 5 or 6 lbs. to be carried.

In next month's and succeeding issues the principal makes of vapor and vapor-vacuum heating systems will be discussed in detail, with a view of giving the reader a comprehensive idea of the various devices and apparatus that have been developed in this branch of the art.

CHICAGO COMMISSION ON VENTILATION

Report on Air Conditions at the Paris Garter Factory

EDITED BY HARRY M. HART.

GENERAL DESCRIPTION:

The building under consideration is a modern, five-story and basement structure of reinforced concrete construction, brick-faced, having a frontage of 113 ft., on Congress Street and 157 ft., on Racine Avenue, Chicago, Ill. It has windows on all four sides and there are no other high buildings adjoining or near it to obstruct the free circulation of air.

The ceiling heights are about 10 ft. on each floor. It is adequately heated by a direct steam system, with cast-iron radiators distributed on the outside walls under the windows, there being approximately 25 radiators on each floor. The basement is heated by means of ceiling coils. The fifth floor is also provided with ceiling coils for offsetting the heat loss through the three sawtooth skylights. There are two stairhalls leading from the basement to the top floor, one being located in the northeast corner of the building and one in the southwest corner.

The ventilation is obtained by means of the windows, each floor having an area of approximately 2100 sq. ft. of wooden sash, double hung, which is equivalent to 13% of the floor area. This is 1 sq. ft. of glass to 77 cu. ft. In addition to the window ventilation the top floor is provided with three sawtooth skylights equipped with eight 24-in. globe type ventilators and two 36-in. propeller fans direct-connected. There is also a 36 in. propellor fan in the caféteria in the basement, which is only operated during the lunch hour.

During the noon hour and at night the windows are opened wide to air the building. During the daytime windows at various points are lowered slightly from the top for ventilation purposes, except in extremely cold weather when all windows are kept closed.

The basement is occupied by the boiler and pump-room, store-room, machine shop and caféteria for the use of the employees. There are about twelve men employed on this floor.

PARIS GARTER FACTORY, CHICAGO.

First floor is occupied by the general office, stock-room and shipping-room; 9 men and 45 women are employed there.

Second floor is devoted to the manufacture of various elastic and rubberized goods. There are 9 men and 210 women employed on this floor.

The third floor is devoted entirely to the manufacture of Paris garters; 2 men and 224 women employed.

The fourth floor is used as a stock-room and for the cutting of raw material to be used in manufacture; 24 men and 5 women employed.

HOME WORK DEPARTMENT, PARIS GARTER FACTORY.

The fifth (top) floor is devoted to the manufacture of paper boxes used to contain the manufactured article, and to the printing incidental to manufacture. Thirteen men and 68 women employed.

There are no dividing partitions on any of the floors excepting in the basement and for the toilets on the upper floors. The entire building is protected against fire by an automatic sprinkler system.

The welfare work of this establishment is in charge of a trained nurse whose quarters, although very inadequate as to size and facilities, are in excellent sanitary condition.

SECOND FLOOR, PARIS GARTER FACTORY.

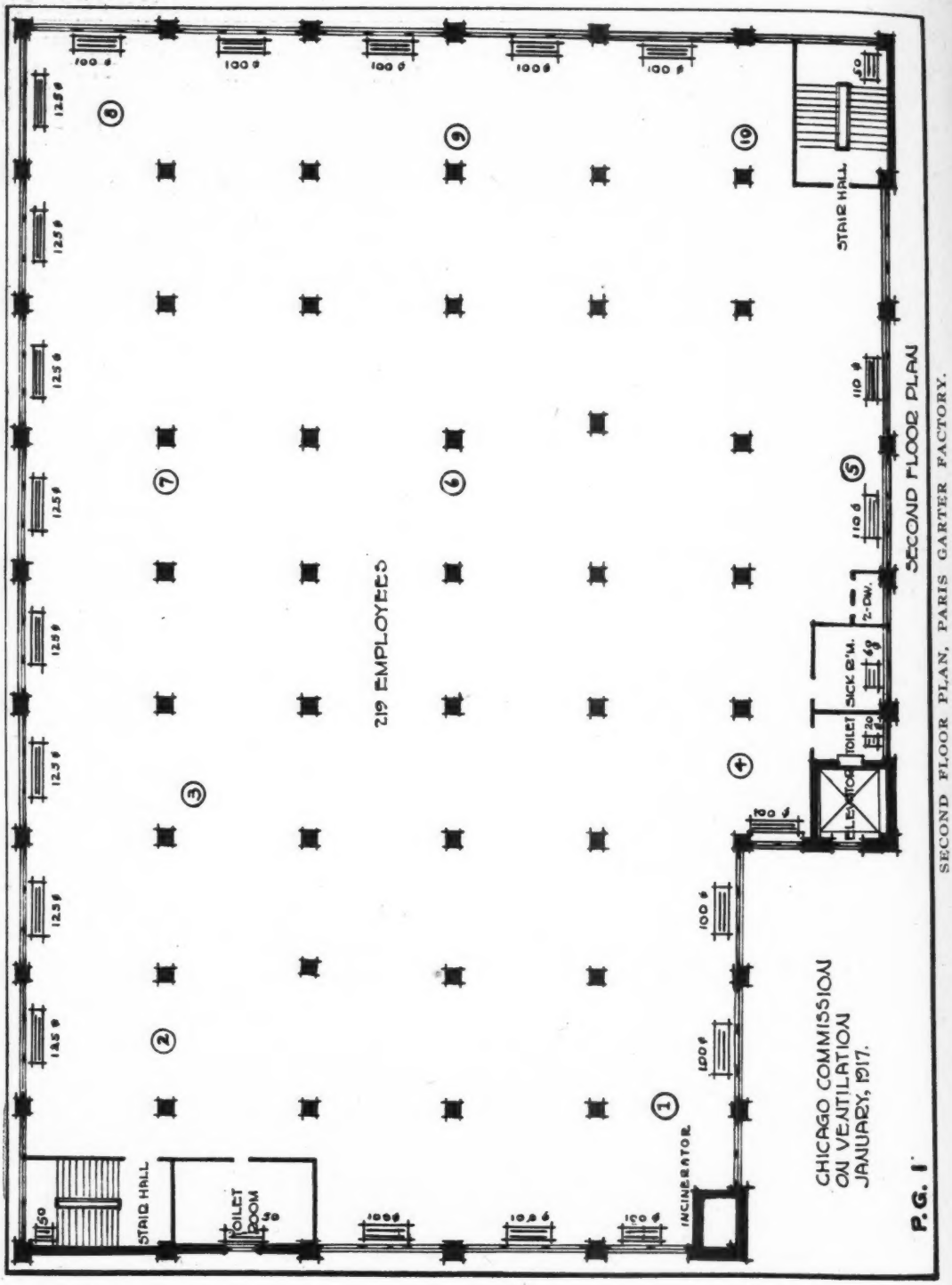
SCOPE AND METHOD OF TEST:

The tests consisted of determination of temperature, humidity, air motion, amount of dust, bacteria, odors and air supply. The temperature and humidity tests were made by use of the sling psychrometer. The number of dust particles per cubic foot of air was determined by the use of Hill's direct dust counter. The bacteria was determined by the use of two-minute exposed culture plates, in accordance with the standard method of the American Public Health Association.

Upon entering rooms the air was sensed to determine the percentage of odors. Samples of air were taken and

NORTH END OF THIRD FLOOR, LOOKING EAST.

ANOTHER VIEW ON THIRD FLOOR, PARIS GARTER FACTORY.



SECOND FLOOR PLAN, PARIS GARTER FACTORY.

analyzed for CO_2 to determine the air supply. Air motion was determined by the use of the anemometer and ammonium chloride apparatus. There were 41 psychrometer readings, 27 dust counts, 79 bacteria tests and 84 CO_2 tests taken. Stations were located on each of the floors on which tests were made that would represent the average conditions. There were ten stations on the first floor, nine on the second, and seven on the third. The locations of these stations are shown on the accompanying sketches, and the results obtained are noted on the test sheets.

A special series of tests was also made to determine the effect on the air movement caused by the exhaust fans and globe ventilators on the fifth floor, by the opening of the stairhall doors and windows.

The first series of tests were to determine the air conditions as they were found to exist during regular working hours, without any notice being taken of the position of the doors or windows, or of the operation of the exhaust fans, and these tests were confined to the second, third and fifth floors where most of the employees were at work.

The data obtained by these tests are given in the accompanying test sheets, and the results indicated by these data are best explained by referring to the synthetic air charts which are compiled from the same.

The Synthetic Air Chart was originally designed on the basis of a certain number of squares above a base line. The results of tests were plotted at the proper height above the base line and the number of squares below this subtracted from the total to arrive at the percentage of perfect. It was contended, with good reason, by some members of the Commission that the chart would be more easily read if the test data were plotted in one dimension rather than in two, as comparisons of the length of straight lines were easier than comparisons of areas.

The original chart has, therefore, been revised and the new design used in this report. The weights and relations used in the original chart have been carried out in this one without any change whatsoever, the only difference being that the test data are plotted as straight lines rather than as areas. The vertical black lines on the new chart give the results of the test in question and its relative importance as compared with other test results.

Two new scales have been added for convenience, called the "Plus and Minus Percentage." The plus percentage indicates the percentage of perfect for the test in question; the minus percentage the amount to be deducted from 100% in arriving at the total percentage for entire test. As an example, in chart No. 13, which is an average of all tests, the column under "Humidity and Air Motion" is penalized 1°. This means that the relation between temperature, humidity and air motion varies 1° from perfect, which gives a plus percentage of perfect for this factor alone of 98% and a penalization on the entire test, that is, a minus percentage of 1.8. The curves for determining the variation of the wet bulb from desirable are printed on the back of the chart.

In general it may be stated that to obtain information as to the conditions in a room, as a whole, the chart is desirable, or to compare these conditions with conditions in some other room or some other test. If the reader wishes to study local conditions in a room he is referred to the test data sheet from which the chart is compiled.*

Tests Nos. 1, 2, 3 and 4, January 11, 1917. Second Floor.

The chart for the second floor compiled from Test Sheets 1, 2, 3 and 4 gives *Temperature, Humidity and Air Motion* a penalization of 1.35%, the relative humidity being too low for the

* For a complete description of the development of the Synthetic Air Chart, see the *Journal* of The American Society of Heating and Ventilating Engineers for July, 1917; also THE HEATING AND VENTILATING MAGAZINE for March, 1917.

PARIS GARTER FACTORY — Sheet No. P.G. 17

SECOND FLOOR TEST NOS. 1 & 2 — Jan. 11, 1917

Time	Occupants	Air Space Per Occupant	Supply Vel. Ft. Per M.	Supply Vol. C.F.M.	Exhaust Vel. Ft. Per M.	Exhaust Vol. C.F.M.	Station	Temperature Dry Bulb	Temperature Wet Bulb	Rel. Hum. %	Air Motion Ft. Per M.	Dust Particles Per Cu. Ft.	Bacteria 2 Min. Plate	Odors % Free From	CO_2	Weather Conditions Temp.	R.H.	Wind Dir.	Wind Vel.
Test No. 1																			
11:05							1	70	58	48			3		6.3				
To							2					5200	3		8.2				
11:40							3						1		3.0				
							4	72	53	25		3200	2		9.5				
							5						3		7.0	DISTRIBUTION = 82.9%			
							6	71	52	23		6200	2		8.5				
							7	70	50	20			1		6.8				
							8												
							9	70	52	26									
							10												
Ave.	219	735		5200				71		28	10	4900	2.1	95	7.9	5	72	N.W.	12
TEST NO. 2																			
12:15							1						3		6.0				
To							2	65	52	40		2600	1		8.0				
12:40							3						2		6.5				
							4	67	52	33		12300	0		7.3				
							5						1		5.1	DISTRIBUTION = 87%			
							6	67	52	33		1400	6		7.5				
							7	67	51	30		6300	7						
							8						3		10.6				
							9	69	51	25		7300	0		6.8				
							10	68	52	28			0		7.4				
Ave.	219	735		8000				67		31.5		6000	2.3	95	7.2	7	71	N.W.	12

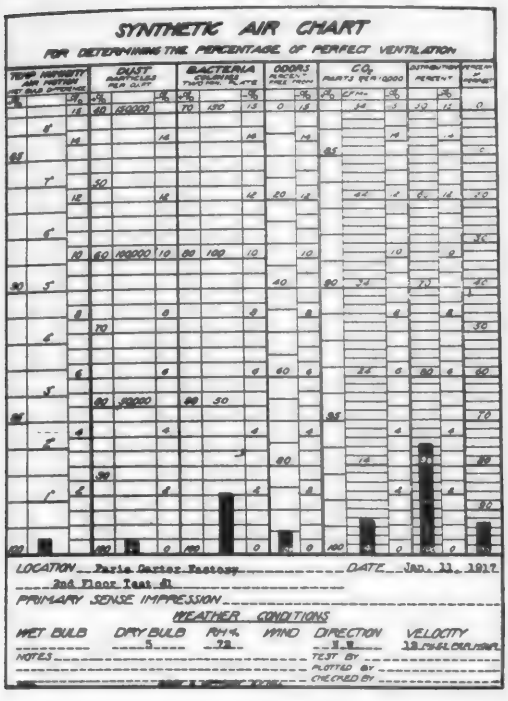
TEST SHEET, SECOND FLOOR, TESTS 1 AND 2.

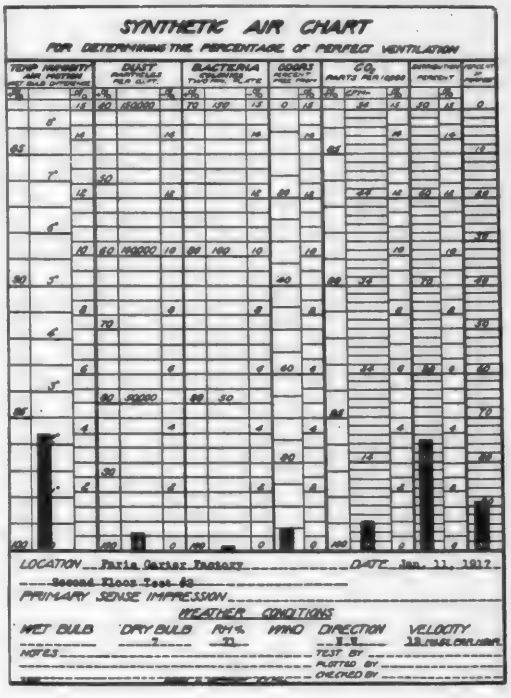
PARIS GARTER FACTORY — Sheet No. P.G. 18

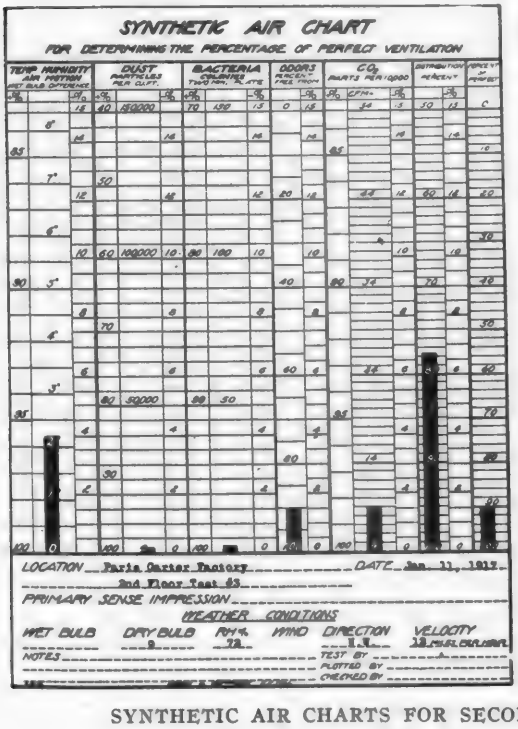
SECOND FLOOR TEST NOS. 3 & 4 — Jan. 11 & 16, 1917

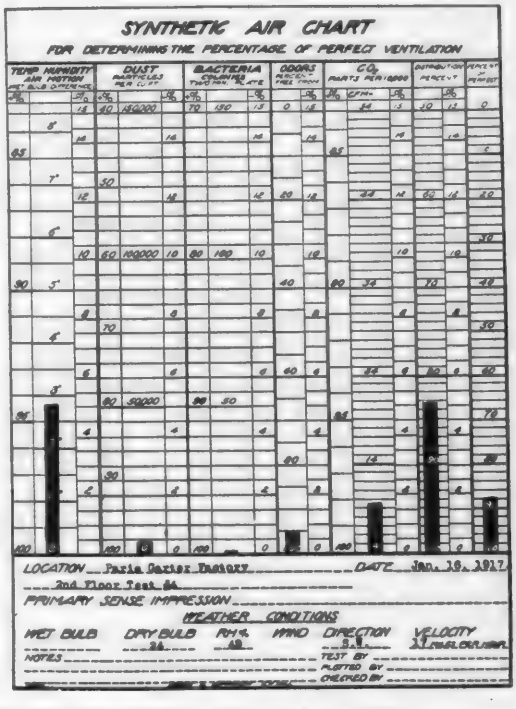
Time	Occupants	Air Space Per Occupant	Supply Vel. Ft. Per M.	Supply Vol. C.F.M.	Exhaust Vel. Ft. Per M.	Exhaust Vol. C.F.M.	Station	Temperature Dry Bulb	Temperature Wet Bulb	Rel. Hum. %	Air Motion Ft. Per M.	Dust Particles Per Cu. Ft.	Bacteria 2 Min. Plate	Odors % Free From	CO_2	Weather Conditions Temp.	R.H.	Wind Dir.	Wind Vel.
Test No. 3																			
2:20							1						0		16.6				
To							2	70	56	40		1500	2		7.5				
2:50							3						4		12.8				
Jan. 11							4	70	54	33		3600	3		10.0				
							5						4		8.5	DISTRIBUTION = 71%			
							6	72	55	32		800	11		6.7				
							7	71	53	27		1500	4		6.0				
							8						2		6.3				
							9	71	54	30		1700	4		7.8				
							10	71	55	33		400	2		8.0				
Ave.	219	735		5000				71		32½	10	1600	3.6	90	9.0	9	72	N.W.	12
Test No. 4																			
2:25							1						8		10.5				
To							2	68	50	22			4		6.8				
2:50							3						5		7.5				
Jan. 16							4	69	52½	30			1		9.0				
							5						1		6.5	DISTRIBUTION = 83.3%			
							6	71	52	23			3		13.8				
							7	70	51½	25			4		7.3				
							8						6		9.0				
							9	71	49	14			6		7.5				
							10						3		7.0				
Ave.	219	735		4800				70		23	10	4200	4.1	95	8.5	24	49	S.W.	17

TEST SHEET, SECOND FLOOR, TESTS 3 AND 4.

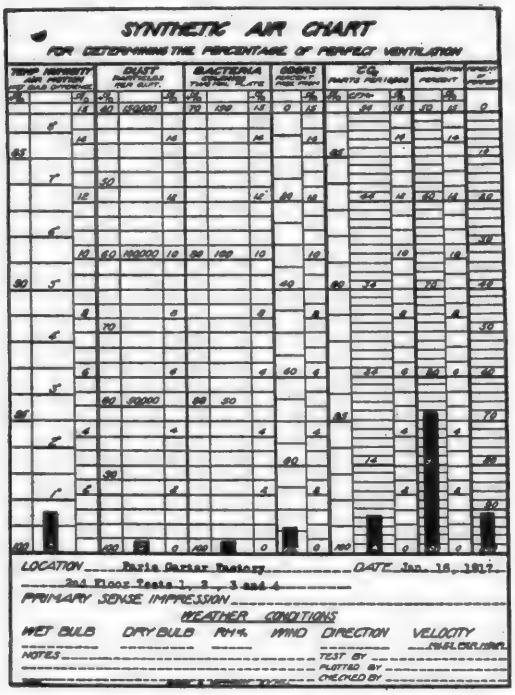

SYNTHETIC AIR CHART
FOR DETERMINING THE PERCENTAGE OF PERFECT VENTILATION
LOCATION Paris Carter Factory DATE Jan. 11, 1917
2nd Floor Test #1
PRIMARY SENSE IMPRESSION
WEATHER CONDITIONS
WET BULB 5 DRY BULB 5 RH% 72 WIND DIRECTION S.W. VELOCITY 13 M.P.H.
NOTES
TEST BY
PLOTTED BY
CHECKED BY


SYNTHETIC AIR CHART
FOR DETERMINING THE PERCENTAGE OF PERFECT VENTILATION
LOCATION Paris Carter Factory DATE Jan. 11, 1917
Second Floor Test #3
PRIMARY SENSE IMPRESSION
WEATHER CONDITIONS
WET BULB DRY BULB 7 RH% 71 WIND DIRECTION S.W. VELOCITY 13 M.P.H.
NOTES
TEST BY
PLOTTED BY
CHECKED BY

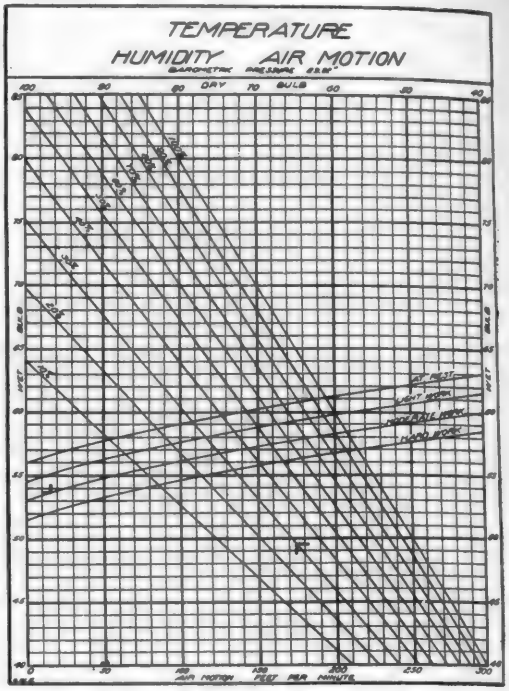

SYNTHETIC AIR CHART
FOR DETERMINING THE PERCENTAGE OF PERFECT VENTILATION
LOCATION Paris Carter Factory DATE Jan. 11, 1917
2nd Floor Test #3
PRIMARY SENSE IMPRESSION
WEATHER CONDITIONS
WET BULB 9 DRY BULB 9 RH% 72 WIND DIRECTION S.W. VELOCITY 13 M.P.H.
NOTES
TEST BY
PLOTTED BY
CHECKED BY


SYNTHETIC AIR CHART
FOR DETERMINING THE PERCENTAGE OF PERFECT VENTILATION
LOCATION Paris Carter Factory DATE Jan. 10, 1917
2nd Floor Test #4
PRIMARY SENSE IMPRESSION
WEATHER CONDITIONS
WET BULB DRY BULB 24 RH% 48 WIND DIRECTION S.W. VELOCITY 31 M.P.H.
NOTES
TEST BY
PLOTTED BY
CHECKED BY

SYNTHETIC AIR CHARTS FOR SECOND FLOOR TESTS, NOS. 1, 2, 3 AND 4.


SYNTHETIC AIR CHART
FOR DETERMINING THE PERCENTAGE OF PERFECT VENTILATION
LOCATION Paris Garter Factory DATE Jan. 16, 1917
3rd Floor Tests 1, 2, 3 and 4
PRIMARY SENSE IMPRESSION
WEATHER CONDITIONS
WET BULB DRY BULB RH% WIND DIRECTION VELOCITY
NOTES
TEST BY
PLOTTED BY
CHECKED BY

AVERAGE OF SECOND FLOOR TESTS.



REVERSE SIDE OF SYNTHETIC AIR CHART.

corresponding temperature and air movement. This condition could easily be improved by some means of artificial humidification.

The *Dust* tests give a penalization of 0.42%, or, in other words, the air is nearly free from dust. Inasmuch as fresh air is taken into the building directly from out-of-doors through the windows, this factor must necessarily be dependent on the outside air conditions as evidenced by the wide difference in samples taken on different days and to the products and methods of manufacture. Dust counts were taken with Hill's direct dust counter.

Bacteria is given a penalization of 0.4%, the average being three cultures on a standard two-minute Petrie dish. Not much improvement in this item could be expected.

Odors are somewhat of questionable importance, the ratings depending a great deal upon the inspector. The inspector giving these ratings always made it a point to note the presence of odors when just entering the room from out-of-doors. Inasmuch as he has given this floor a rating of 94% on this item, it seems reasonable to assume that very little odor of any kind was present and penalization is 0.9%.

Air Supply: 22 to 37 C. F. M. per person. Test No. 13, given later, will show that it would be possible to obtain as much as 44 C. F. M. per person by proper operation of the exhaust fans and opening of windows and doors.

Average CO_2 (8.2) is taken as a check on the volume of fresh air supply per occupant, as well as a means of determining the distribution of the fresh air. The penalization is 1.26%.

Distribution is given a rating of 84.2% on account of the wide difference in the air samples taken at various stations. This causes a penalization of 4.74%. It will also be noted that the different samples taken at the same stations on different days varied greatly, indicating that the windows were not always open at the same point even with the wind in the same direction. This only emphasizes the importance of proper manipulation of the windows, giving preference to the locations where

PARIS GARTER FACTORY — Sheet No. P.C. 19

THIRD FLOOR - TEST NOS. 5 & 6 — Jan. 12, 1917

Time	Occupants	Air Space Per Occupant	Supply Vel. Ft. Per M.	Supply Vol. C.F.M.	Exhaust Vel. Ft. Per M.	Exhaust Vol. C.F.M.	Station	Temperature Dry Bulb	Temperature Wet Bulb	Rel. Hum. %	Air Motion Ft. Per M.	Dust Particles Per Cu. Ft.	Bacteria 2 Min. Plate	Odors % Fresh Air	CO_2	Weather Conditions Temp.	R.H.	Wind Dir.	Wind Vel.
Test No. 5																			
12:20							1	69	56	42			3		8.0				
To							2						4		8.5				
1:00							3	69½	52½	29			5		13.1				
							4						6		5.0				
							5						2		7.3	DISTRIBUTION-81%			
							6	72	54½	29			5		6.0				
							7						3		5.8				
							8	72½	54	27		14400	9		9.3				
							9						6		7.8				
Ave.	226	715		4200				71		32	10	14400	4.8	95	8.4	19	85	S.E.	18
Test No. 6																			
3:15							1	70	54	32		12300	3						
To							2						6		10.0				
3:45							3	72½	56½	35		11200	5						
							4						1		9.0				
							5						1		18.0				
							6	74½	56½	30		8000	6		10.0	DISTRIBUTION-77.5%			
							7						5		15.0				
							8	74½	58½	37		2700	3		10.0				
							9						2		15.0				
Ave.	226	715		2500				73		33½	10	8500	3.5	85	12.3	20	88	S.E.	13

TEST SHEET, THIRD FLOOR, TESTS 5 AND 6.

the greatest number of employees were.

Taken as a whole, the room is given a penalization of 90.93% which could easily be raised to 95% by giving proper attention to air distribution and humidity.

Tests Nos. 5, 6 and 7, January 12 and 17, 1917.
Third Floor.

Chart for third floor compiled from Test Sheets 5, 6 and 7 gives the following results:

Temperature, Humidity and Air Motion. Penalization is 1.36%, the relative humidity being too low in Test No. 7.

Dust: Penalization is 1.15%; not quite as good as the second floor.

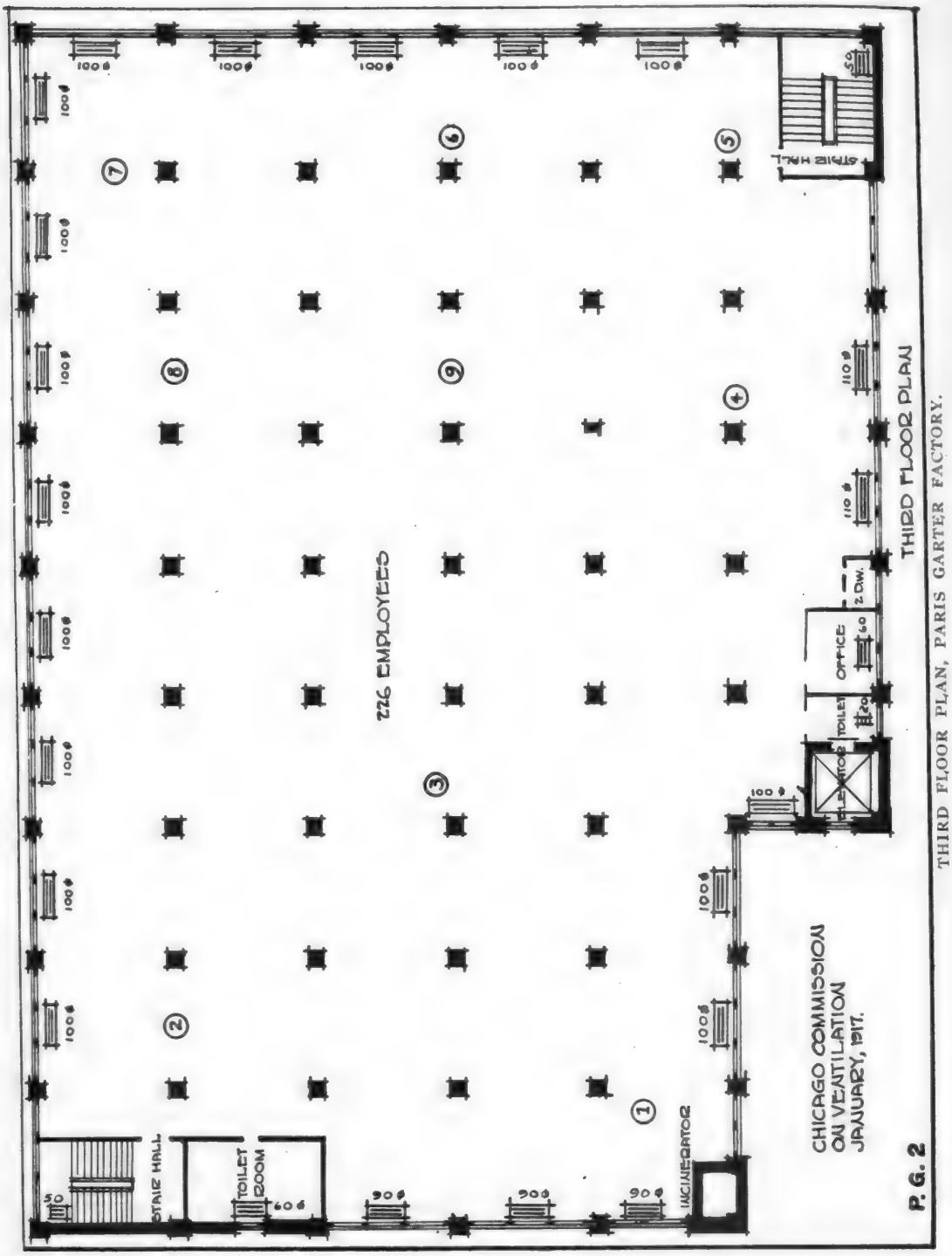
Bacteria: Penalization is 0.41%; all samples were fairly good except at station No. 1, Test 7. This plate may have

PARIS GARTER FACTORY — Sheet No. P.C. 20

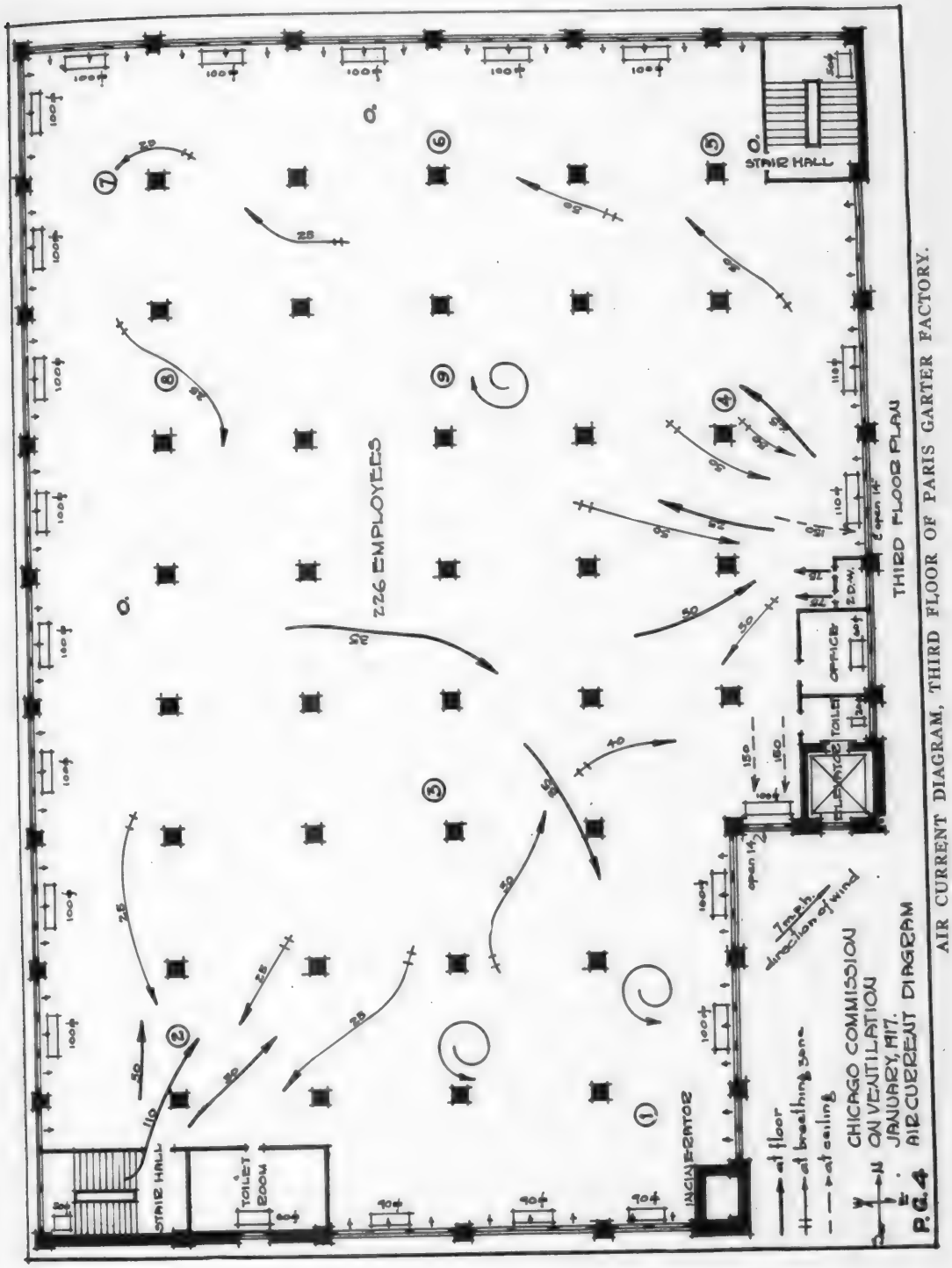
THIRD FLOOR - TEST NO. 7 — Jan. 16, 1917

Time	Occupants	Air Space Per Occupant	Supply Vel. Ft. Per M.	Supply Vol. C.F.M.	Exhaust Vel. Ft. Per M.	Exhaust Vol. C.F.M.	Station	Temperature Dry Bulb	Temperature Wet Bulb	Rel. Hum. %	Air Motion Ft. Per M.	Dust Particles Per Cu. Ft.	Bacteria 2 Min. Plate	Odors % Fresh Air	CO_2	Weather Conditions Temp.	R.H.	Wind Dir.	Wind Vel.
Test No. 7																			
1:30							1	72	53	25			11		16.3				
To							2						1		14.4				
1:50							3	72½	52½	22			4		14.6				
							4						4		12.0				
							5						4		14.5	DISTRIBUTION-83.5%			
							6	72½	51½	17			0		10.2				
							7						5		9.5				
							8	72	54	26			4		11.0				
							9						4		9.8				
Ave.	226	715		2700				72		22½	10	11500	5.1		12.5	25	88	S.W.	17

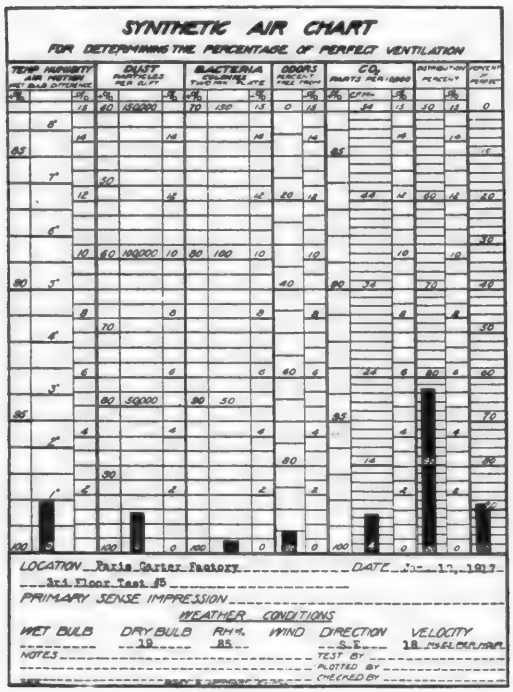
TEST SHEET, THIRD FLOOR, TEST 7.

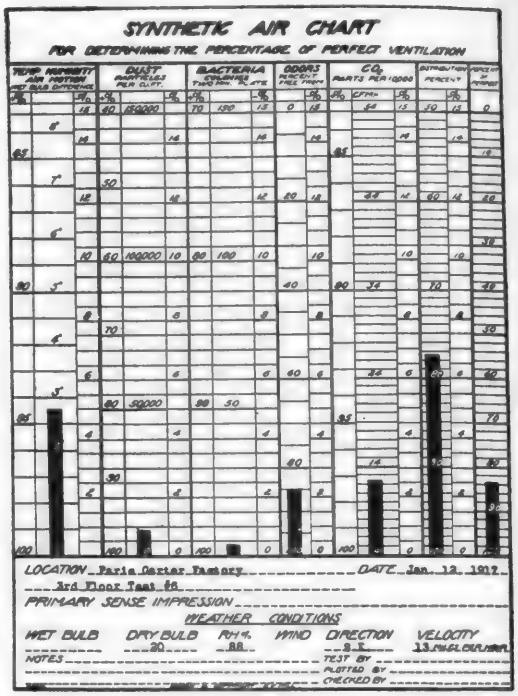


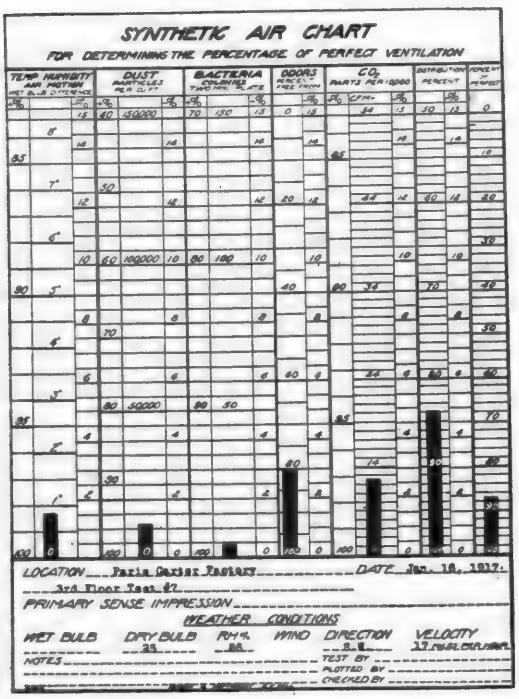
THIRD FLOOR PLAN, PARIS GARTER FACTORY.

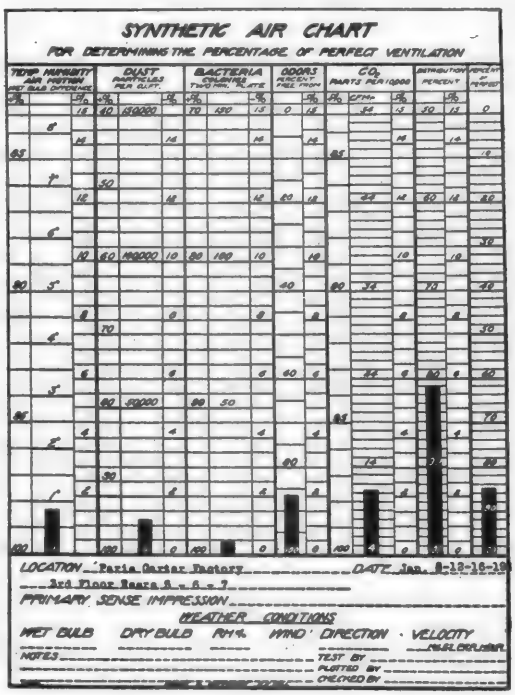


AIR CURRENT DIAGRAM, THIRD FLOOR OF PARIS GARTER FACTORY.








SYNTHETIC AIR CHART
FOR DETERMINING THE PERCENTAGE OF PERFECT VENTILATION
LOCATION Paris Garter Factory DATE Jan. 8-12-16-19
3rd Floor Tests 5 - 6 - 7
PRIMARY SENSE IMPRESSION
WEATHER CONDITIONS
WET BULB DRY BULB RH% WIND DIRECTION VELOCITY
NOTES
TEST BY
PLOTTED BY
CHECKED BY

SYNTHETIC AIR CHARTS FOR THIRD FLOOR TESTS, NOS. 5, 6 AND 7.

been subjected to an unusual or excessive air current during this one exposure.

Odors: Penalization is 1.95%; not as good as second floor, probably due to the lower volume of fresh air supply per occupant.

Air Supply: The maximum fresh air supply indicated 18.6 C. F. M. per person, probably due to the neutral location of this floor, which would decrease the natural air movement. This floor should be favored with opening the windows in the building. This is one of the conditions which is not so apt to be met where a mechanical air supply system is installed.

Average CO_2 (11.1) is, as hereinbefore stated, entirely due to the volume of fresh air supplied per occupant. The penalization is 2.13%.

Distribution, as indicated by the CO_2 tests about the same as second floor and is given 81%, or a penalization of 5.7%.

This floor, as a whole, is given a rating of 87.30% and could be improved by providing a greater air supply and better distribution.

Tests Nos. 8 and 9, January 12 and 16, 1917.

Fifth Floor.

Chart for fifth floor compiled from Test Sheets 8 and 9 gives the following results:

Temperature, Humidity and Air Motion: Penalization is 7.65%, the temperature and relative humidity being too low.

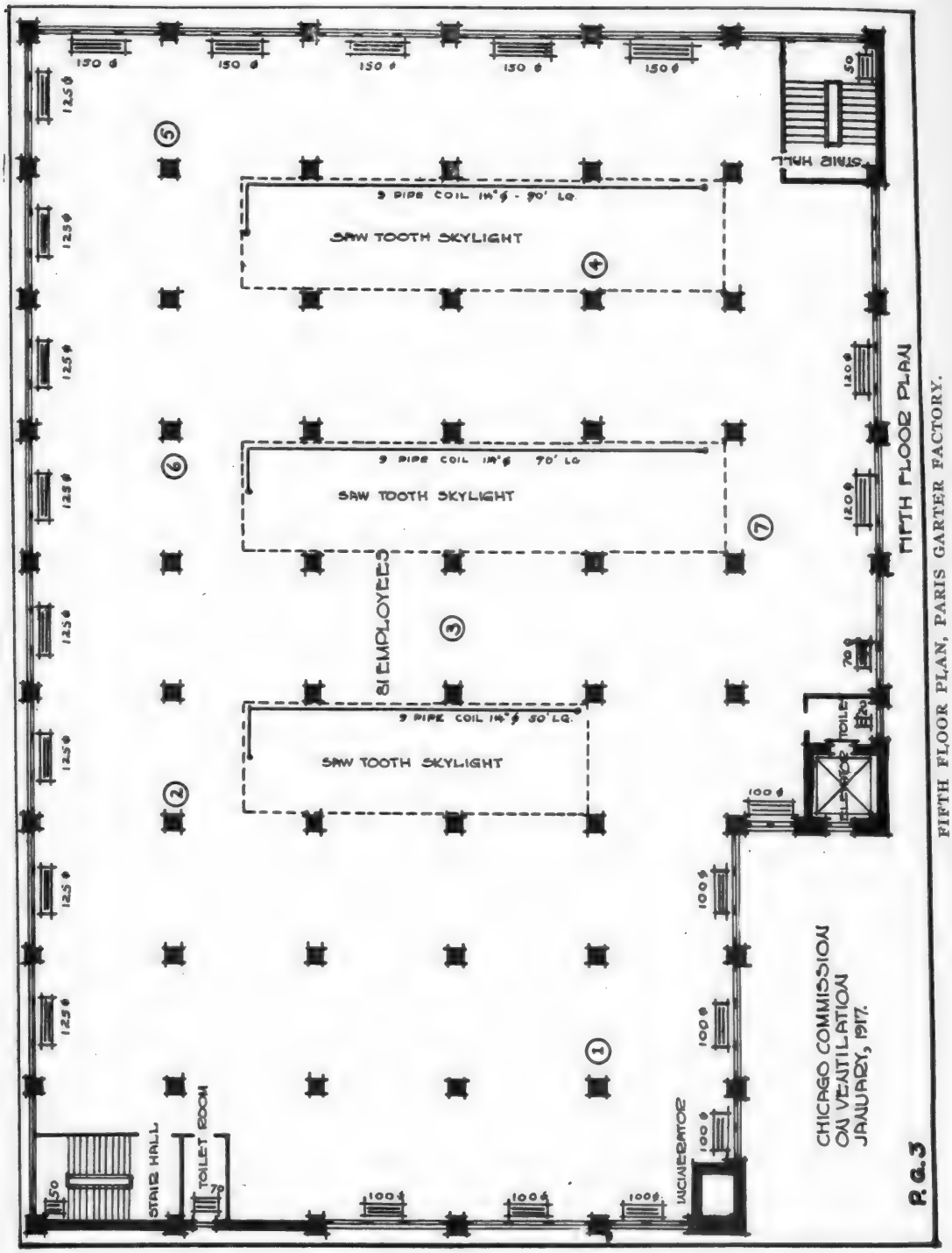
This, being the top floor and provided with natural ceiling vents as well as the two 36-in. exhaust fans, naturally loses a great amount of heat, and when the stairhall doors are closed, the cold draft near the windows is very objectionable. This can easily be improved by keeping the stairhall doors opened on all floors, as indicated, by results given in Test No. 12.

PARIS GARTER FACTORY — Sheet No. P.G. 21

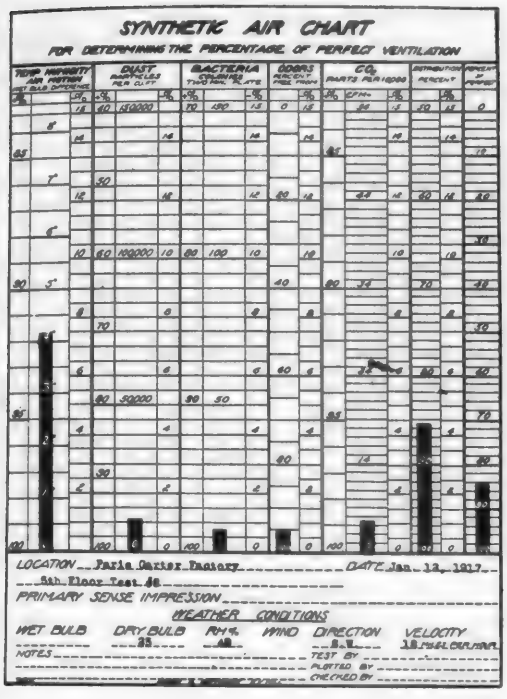
FIFTH FLOOR — TEST NOS. 8 & 9 — Jan. 12 & 16, 1917

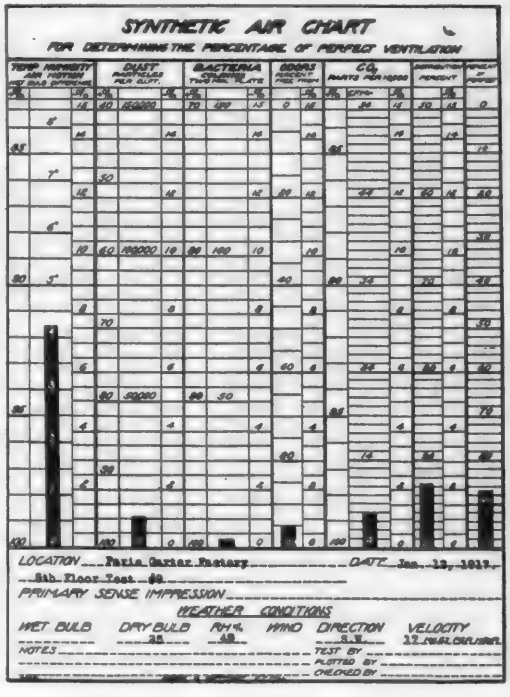
Time	Occupants	Air Space for Occupant	Supply Vel. Ft. Per M.	Supply Vol. C.F.M.	Exhaust Vel. Ft. Per M.	Exhaust Vol. C.F.M.	Station	Temperature Dry Bulb	Temperature Wet Bulb	Rel. Hum. %	Air Motion Ft. Per M.	Dust Particles Per Cu. Ft.	Bacteria 2 Min. Plate	Odors % Free from	CO_2	Weather Conditions Temp.	R.H.	Wind Dir.	Wind Vel.
Test No. 8																			
2:35							1	62	48	32		5200	5		8.0				
TO							2						15		8.3				
2:52							3	63	49½	36		11200	5		6.8				
Jan. 12							4	63½	50	37		12300	6		9.0	DISTRIBUTION = 85.5%			
							5						4		7.3				
							6	64½	51½	30		11800	15		6.7				
							7						5		5.4				
Ave.	81	2000		2200				63		34	10	10100	7.6	95	7.4	25	49	S.E.	18
Test No. 9																			
12:30							1	66	50	32			2		6.5				
TO							2						5		7.3				
12:50							3	65	49½	30			1		7.2				
Jan. 16							4	65	49½	30			7		8.3	DISTRIBUTION = 92.7%			
							5						2		9.4				
							6	66	49	28			2		7.5				
							7						4		8.2				
Ave.	81	2000		2000				65		30	10	10100	3.3	95	8.0	25	49	S.W.	17

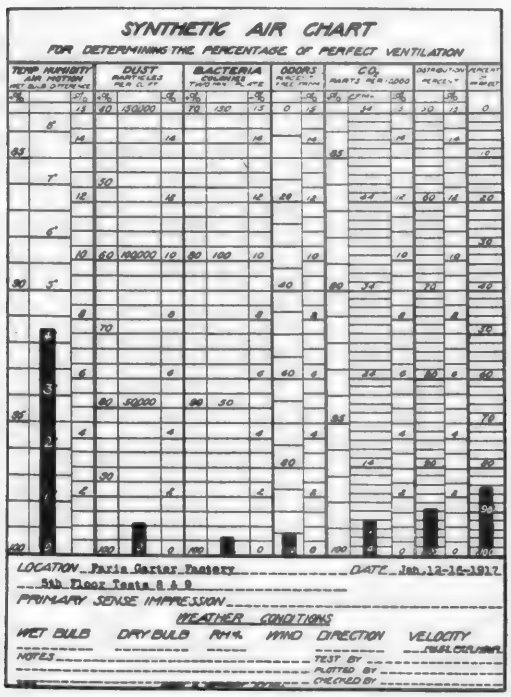
TEST SHEET, FIFTH FLOOR, TESTS 8 AND 9.

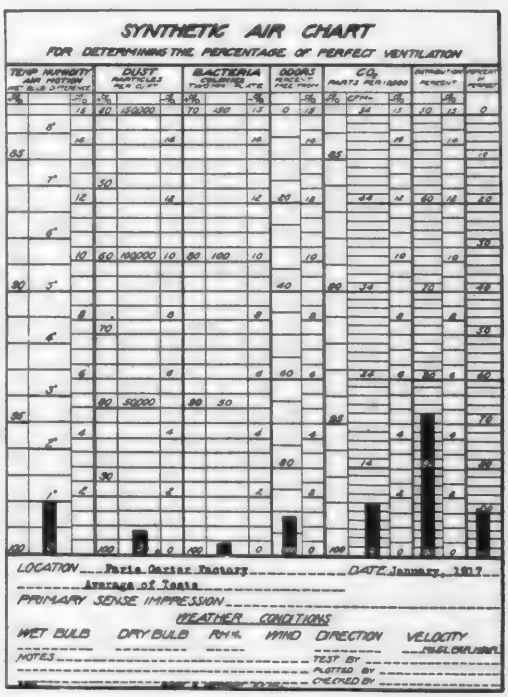


FIFTH FLOOR PLAN, PARIS GARTER FACTORY.


SYNTHETIC AIR CHART
FOR DETERMINING THE PERCENTAGE OF PERFECT VENTILATION
LOCATION Paris Garter Factory DATE Jan. 12, 1917
5th Floor Test #8
PRIMARY SENSE IMPRESSION
WEATHER CONDITIONS
WET BULB DRY BULB 35 RH% 48 WIND DIRECTION S.W. VELOCITY 18 M.P.H.
NOTES
TEST BY
PLOTTED BY
CHECKED BY


SYNTHETIC AIR CHART
FOR DETERMINING THE PERCENTAGE OF PERFECT VENTILATION
LOCATION Paris Garter Factory DATE Jan. 13, 1917
5th Floor Test #9
PRIMARY SENSE IMPRESSION
WEATHER CONDITIONS
WET BULB DRY BULB 25 RH% 48 WIND DIRECTION S.W. VELOCITY 17 M.P.H.
NOTES
TEST BY
PLOTTED BY
CHECKED BY





SYNTHETIC AIR CHARTS FOR FIFTH FLOOR TESTS NOS. 8 AND 9, AND AVERAGE OF TESTS.

FIFTH FLOOR, PARIS GARTER FACTORY, LOOKING NORTHWEST.

Dust: Penalization is 1.01%; about the same as the third floor.

Bacteria: Penalization is 0.55%; the same as second and third floors.

Odors: Penalization is 0.75%. The same as the second floor.

Air Supply averages 25.7 C. F. M. per person.

Distribution is given 89.1%, being a little better than the second and third floors and causes a penalization of 3.27%.

Average CO_2 (7.7) causes a penalization of 1.11%.

As a whole, this floor is given a rating of 85.66%, which could be greatly improved by raising the temperature and relative humidity of the room.

FIFTH FLOOR, PARIS GARTER FACTORY, LOOKING WEST, SHOWING SKYLIGHTS.

In the continuation of this report which will appear in the June issue, the results will be presented of a second series of tests (from Nos. 10 to 15, inclusive) made with special reference to the effect of the exhaust fans and natural ventilators at the ceiling of the top floor on the air movement throughout the building. There will also be presented a discussion of both series of tests.

Relation of Respiratory Diseases to Classroom Ventilation.

In order to obtain concrete evidence of the value of fresh air, especially evidence based on extensive observations with suitable controls, the Bureau of Child Hygiene in 1916 began an inquiry into the possible relationship between the prevalence of respiratory diseases among school children and classroom ventilation.* The study was made in cooperation with the New York State Commission on Ventilation, which had full control of the selection of the classrooms with reference to the type of ventilation to be included, the supervision of methods used in obtaining and recording all data concerning ventilation, and the final analysis of the results recorded

This investigation among 5,533 pupils in 76 classrooms in 12 schools operated under three different types of ventilation, conducted during a five-months period in the late fall, winter and early spring, forms the basis for the following conclusions:

1. In the closed window, mechanically ventilated type of classroom kept at a temperature of about 68° F., the rate of absences from respiratory diseases was 32% higher than in the open-window, naturally ventilated type of classroom kept at the same temperature (about 68° F.) and about 40% higher than in the open-window, naturally ventilated type of classroom kept at a temperature of about 50°F. In other words, the children in classrooms with closed windows and ventilated by mechanical methods were more subject to respiratory diseases severe enough to keep them from school attendance than were children who were in classrooms kept at the same or lower temperature and ventilated wholly by open windows.

2. In the closed-window, mechanically-ventilated type of classroom kept at a temperature of about 68° F., the rate of respiratory diseases occurring among pupils in attendance was 98% higher than in the open-window, naturally ventilated type of classroom kept at the same temperature (about 68° F.) and about 70% higher than in the open-window, naturally ventilated type of classrooms, kept at a temperature of about 50°. In other words, the children in classrooms with closed windows and ventilated by mechanical methods were more subject to respiratory diseases not sufficiently severe to keep them from school attendance than were children who were in classrooms kept at the same or lower temperature and ventilated wholly by open windows.

3. The relative humidity of classrooms, whether ventilated by natural or mechanical means, was not a causative factor in the occurence of respiratory illness among school children.

* "Classroom Ventilation and Respiratory Diseases Among School Children," by S. J. Baker, M. D., D. P. H., American Journal of Public Health, January, 1918.

New York Board of Health Interprets "Adequate Ventilation."

In interpreting the meaning of the term "adequate ventilation," as used in the sections of the sanitary code of New York City, relating to the occupancy of premises by persons, action in the enforcement of the code will hereafter be governed by the standards of ventilation adopted by resolution of the Board of Health on December 11, 1917. These are as follows:

1. Temperature—The temperature in rooms during periods of occupancy should register preferably from 60° to 70° F. at all times, except when the outside temperature exceeds 60° F. This does not apply to rooms used for special purposes, such as industrial places where high or low temperatures are essential and unavoidable.

2. Humidity—The relative humidity in occupied rooms should not exceed 70%, except when the outside bulb temperature exceeds 59°. In no case, however, should the wet bulb temperature exceed 78°.

3. Carbon Dioxide—The carbon dioxide in occupied rooms in all classes of buildings should not at any time exceed 10 parts in 10,000 volumes of air in any part of the occupied spaces of the rooms.

4. Dust—The dust particles in the air of occupied rooms in all classes of buildings should not exceed 1,000,000 per cubic foot, or 0.004 (4 miligrams per 100 cu. ft.).

5. Bacteria—The bacteria content should not exceed 100 per cubic foot.

6. Odors—The air of occupied rooms of all classes of buildings should be free from objectionable odors, which may be detected by persons entering the room from the outside air, whether the odors are of human origin or otherwise.

Immediate Construction Urged of Vehicular Tunnel Under Hudson River.

The New York State Bridge and Tunnel Commission has recommended to the legislature the immediate construction of the vehicular tunnel under the Hudson River, which was described in the April issue.

The commission estimates that the tunnel could be built within three years at a cost of $12,600,000. It urges that had the tunnel been in existence last winter there would have been no coal famine.

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A Monthly Journal of Engineering Progress
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Vol. 15 May, 1918 No. 5

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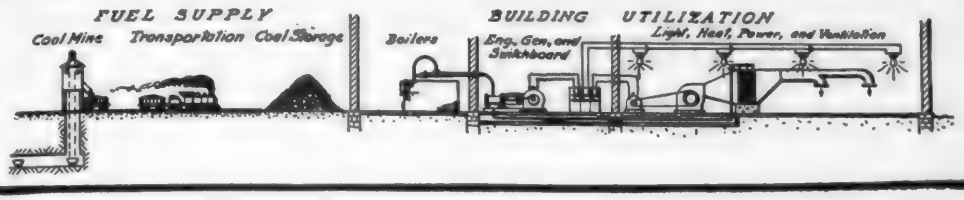
THE heating trade is about to experience one of the most remarkable campaigns for the extension of business that has ever been undertaken in this field. With the backing of all the important national organizations of manufacturers, supply dealers and contractors of heating and plumbing apparatus, the trade is being prepared for a four-months intensive effort for "new equipment in old buildings," under the slogan of "Building Bigger Business."

One has only to refer to the reports of building operations issued from month to month to know that construction work in this country is at an abnormally low level. So far, the government's vast building programme has more than made up for this deficiency, in total volume of business, but not in its general distribution. Some industries have increased their output to an extraordinary degree, while other "non-essential" industries have suffered to a corresponding extent. This is also true of the contractir end of the building trade. Those in the zone of the government's activities are being hard put to it to take care of the volume of work almost literally thrown at them, while those in the outlying sections, so to speak, are high and dry.

It is, therefore, a happy thought and one based on sound business sense that has prompted the national trade organizations to awaken the trade to its opportunities in the neglected field of re-equipping old buildings. The wonder is that this class of business has not attracted more attention than has been given it in the past. To consider only the construction during the past twenty years, there must be and there are literally thousands of structures of all sorts that are today in crying need of new heating and plumbing equipment. The problem of the hour is how to go after this business on a broad scale. It is obvious that the first step is a nation-wide publicity campaign in the representative trade journals. This will make a splendid beginning, but the work must not be allowed to stop there. Every heating contractor and every plumbing contractor must make it his business to boost the campaign among his patrons. Talk new equipment. Advertise it in your local papers. Single out those cases, which may be found in any community, where the prospects are especially good for interesting the owners in new and better heating and plumbing systems. Many householders will be found who have only the faintest idea of the comfort and luxury of a modern heating plant, to say nothing of the plumbing conveniences that are now offered.

"Building Bigger Business" means more profits for every one in the trade. So let us all get in on this movement. The manufacturers are doing their part. It is for the rest of the trade to back their efforts by carrying the message home in every locality, not next month or next Fall, but —*Now.*

POWER PLANT ENGINEERING



The Need of the Building Power Plant in War Times

The recent coal shortage has been seized upon in some quarters as a reason for renewing the agitation for the elimination of isolated plants in favor of central electric power stations. The fuel conservation authorities are being told that a saving in coal consumption can be made by forcing the shutting down of all the isolated plants in central station districts and the supplying of electric current from the central plants.

In discussing the merits of this proposition, it should be stated at the outset that there are and always will be cases where the conditions will warrant the use of central station service. It is desired, however, to consider here the reasons generally brought forward why an individual power plant should not be installed when central station service is available. These reasons may be summed up as follows:

ARGUMENTS AGAINST INDIVIDUAL PLANTS.

1. The individual plant cannot be installed at the cost estimated.

2. It cannot be operated at the cost expected.

3. Some invention may revolutionize the methods of power-production, making the investment in the private apparatus valueless and necessitating the scrapping of the whole equipment.

These main points are in addition to local arguments, such as the danger of having high-pressure boilers in a building, the likelihood of breakdowns, etc.

It is well known and easily understood that an isolated plant would not be a paying investment in a private residence. The cost of the amount of current used in a year would not pay a man's wages for one week to look after the power-producing apparatus. Similarly, for a two-family house, and smaller tenements. But when office buildings, railroad stations and group buildings are considered, this statement ceases to be true. What the actual economies will be in such cases will vary in each instance and with the local conditions under which the plant would have to be operated.

OVERALL COAL CONSUMPTION THE VITAL FACTOR.

When one states that it is possible to save in operating cost by installing an isolated plant, it is necessary to show that the overall coal consumption will be less, for the following reasons:

(*a*) The cost of the small plant per kilowatt is higher than the large central stations and, therefore, the interest on the investment must be higher, as well as the depreciation of the equipment.

(*b*) The cost of labor is higher per kilowatt in the small plants, as an engineer and fireman have to be employed for each plant regardless of how small it may be, while the central stations, with their large units and big kilowatt production, have a much smaller labor charge per kilowatt developed.

(*c*) The efficiency of the small plants, kilowatt for kilowatt, when compared with the large central stations, is liable to be somewhat less.

Now the cost of operating the small plant is composed of the following items:

Interest on investment.
Depreciation.
Labor.
Miscellaneous Supplies.
Repairs.
Coal.

If it is admitted that (per kilowatt) the small plant has a greater interest charge to meet, a higher labor charge, a bigger depreciation and a lower efficiency, and if, in spite of all these [illegible]ts, the small plant can come through the year without a loss (to say

nothing of making a saving, as many of them do) wherein is the difference made up? Certainly *not* in the supplies or repairs (which are of small financial moment) but in the only remaining item, *the coal pile.*

It will be noted that the central station companies, in pointing out their higher efficiencies *in their power houses* are very apt to overlook the transmission losses in their *distribution lines* which in themselves are sufficient to overcome any reasonable difference between the efficiency of the large station and that of the small plant, unless under very unusual conditions. Therefore, it becomes a pertinent question to ask whether a kilowatt can be delivered at the building with the consumption of any less coal by the large central station than by producing it on the premises.

Whether the foregoing question is answered "Yes" or "No" an even more important question looms up in connection with the matter of heat. In the present discussion we are only considering those central stations that do not make any effort to supply heat. The small building power plant almost invariably operates so as to utilize the heat in its exhaust either to heat the building, furnish hot water for service, steam for refrigerating, or in other ways. On this account practically no coal at all is burned to supply power during the heating season. As this involves the six months of the year during which the shortest and darkest days occur, the coal required to supply power during the summer months will not have to furnish half the yearly consumption by any means; probably one-third would be more nearly correct.

TYPICAL SUMMARY OF CENTRAL STATION OPERATION.

The following summary is a fair average of the way the central stations operate:

TABLE 1—TYPICAL OPERATING SUMMARY.

Steam-Turbo Electric Stations.

Coal 14,000 B.T.U., 190 lbs. pressure, 125° F. superheat, 190° F. feed.

B.T.U. required to generate a pound of steam—heating from

190° to 384°	198 B.T.U.
Evaporating at 190 lbs. pressure	842 B.T.U.
Superheating 125° (mean superheating 56°)	70 B.T.U.
Total	1100 B.T.U.

Average overall furnace and boiler efficiency, 60%.

Effective B.T.U. per pound of fuel,—8400 B.T.U.

Pounds of steam generated per pound of fuel, 7.56 lbs.

Used in turbines	19 lbs.
Used in auxiliaries	3 lbs.
Total water per hour	22 lbs.

Pounds of coal per kilowatt generated, 2.91 lbs.

SUMMARY HEAT STATEMENT.

Total heat contained in coal, 2.91 × 14,000	40,700 B.T.U.
1. Efficiency of transformation of chemical energy to heat, and (2) efficiency of transmitting heat to water, 60%, leaving	24,000 B.T.U.
3. Efficiency of transforming heat to mechanical energy, 15.6%, leaving	3,600 B.T.U.
4. Efficiency of transforming mechanical to electrical energy, 90%, leaving	3,420 B.T.U.

Overall heat efficiency of station, 3420/40,700, or 8.4%.

From this table it does not look as if the large central stations were such large savers, after all, for of every pound of high-grade coal they burn, only 8.4% is utilized and the transmission line losses may cut this to 7.5% or 8%, flat.

Suppose the building power plant has an efficiency of only 80% of that attained by the central station,—and even the central station enthusiasts would hardly go below that figure for an average—then for every pound of coal burned for power during the summer the efficiency would be 8.4 × 75%, or 6.3%. During all of the non-heating months the plant would have a heat efficiency of 6.3%, this being the number of B.T.U. actually turned into electric current and delivered at the switchboard. But during the heating season, the heat efficiency will be 6.3% *plus whatever exhaust is turned into the heating system* (the exhaust seldom containing less than 60% and more than 65% of the total heat) so that the winter efficiency is at least 6.3% + 60%, or 66.3%. If the average winter load runs 50% more than the average summer load, then one-third of the total kilowatt hours are furnished in the summer and two-thirds of the total kilowatt hours are furnished in the winter. The average efficiency will then be:

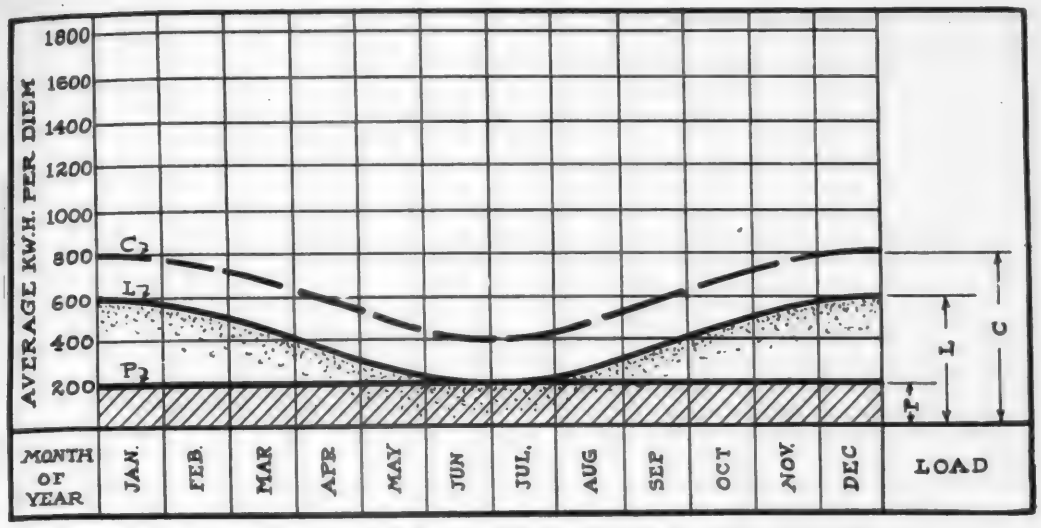


FIG. 1—TYPICAL BUILDING POWER PLANT LOADS FOR ONE YEAR.

6.3 × 6 months × ⅓ = 12.6
66.3 × 6 months × ⅔ = 265.2

277.8

277.8/12 = 23.1% average yearly efficiency.

DATA FROM A TYPICAL BUILDING.

The main subject for discussion, however —pounds of coal per year—should not be allowed to become buried under the matter of efficiency. Good or poor efficiency is of secondary importance at the present time unless affecting the coal used per kilowatt delivered.

For the purpose of illustrating the comparative efficiency of a central station plant as compared with an individual power plant, a typical building has been assumed, the power loads being as indicated in Fig. 1. Here the power load, P, has been shown as fairly constant throughout the year, while the light load, L, has been assumed to vary from the minimum during the longest days in summer to the maximum of three times as much during the shortest days in winter. Whether this is exactly correct proportion or not is immaterial, as the point desired to be brought out is the fact that the winter lighting load is much heavier than the summer; probably the ratio in many cases would run one to six or even one to ten.

The sum of the power load, P, plus the light load, L, equals the combined load, C, or

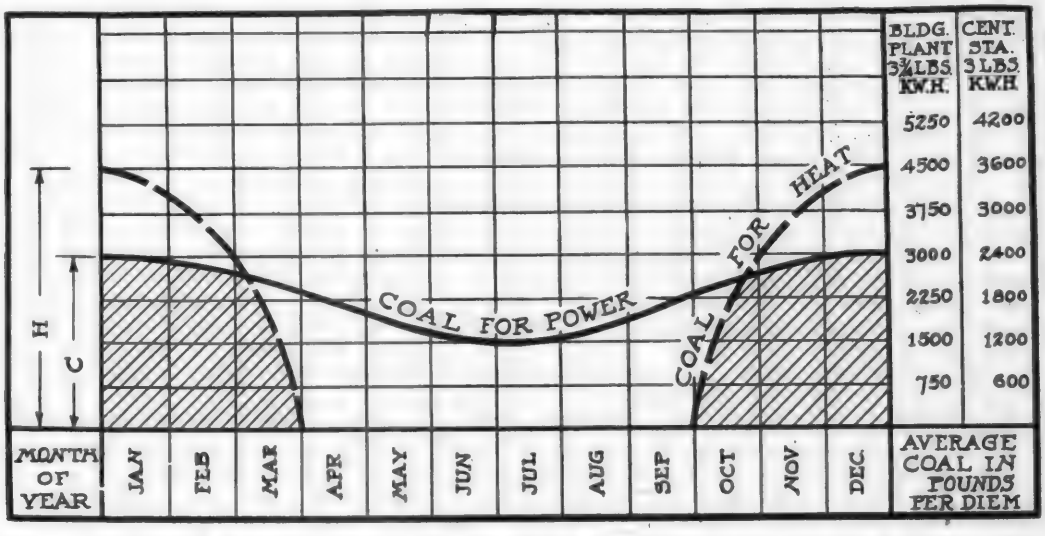


FIG. 2—BUILDING POWER LOAD AND HEATING REQUIREMENTS. BOTH PLOTTED IN POUNDS OF COAL.

$$P + L = C$$

From this curve, C, it can be seen that at its highest point, about December-January, it reaches a maximum daily average of around 800 Kw. H., which would indicate a plant capacity of somewhere in the neighborhood of 200 Kw.

On the chart shown in Fig. 2 the combined load, C, obtained in Fig. 1 is plotted as pounds of coal; on the left-hand side the first scale shows the pounds of coal required at 3¾ lbs. per kilowatt hour (if produced in the building) and the second scale, the number of pounds of coal required at 3 lbs. per kilowatt hour (if produced in a central station). The reason for the adoption of the 3 lb. and 3¾ lb. figures is as follows:

The central station produces a kilowatt hour with a fraction less than 3 lbs., as has already been seen in Table 1, and, therefore, the 6 lbs. is approximately correct. The building plant, with a lower efficiency—say 80% of that attained by the central station—produces the same kilowatt hour with 3¾ lbs. of coal, thus:

Central station = 3 lbs. coal ÷ 3 lbs. per kilowatt hour = 1 Kw. H. produced while Building plant = 3¾ lbs. coal ÷ 3 lbs. per kilowatt hour × 80% = 1 Kw. H. produced.

Therefore, whether these figures may be a fraction above or a fraction below the mark is not essential as long as they are relatively correct.

On this chart is also plotted the average daily pounds of coal required for heating from October 1 to April 1; this is based on the assumption that the maximum average heating load, H, on the coldest day, is 50% greater than the maximum average power load during the same period, so C + 50% C = H. In many buildings the ratio is much higher, but this would increase the shaded area slightly which would be to the further advantage of the building plant, as will be seen later.

The shaded portion indicates the number of kilowatt hours during the year for which the coal *necessarily burned to heat the building* can be utilized in a building plant to supply heat, light and power at the same time. The chart demonstrates very clearly that during the months of November, December, January and February, no additional coal need be purchased for power, while in October and March a small portion only will be required.

The chart shown in Fig. 3 is a comparison in pounds of coal of the two alternate propositions; *viz.*, the supplying of the building's combined power and light load, C, by the building plant, B, giving the curve CB (a reproduction of the curve for power in Fig. 2) and the furnishing of its heat, H, by the same building plant, B, giving the building heating curve, HB, together with the alternative proposition of furnishing the combined building load, C, from a central station, C, at higher efficiency, giving the lower curve CC, on top of which (during the winter months) all the coal for heating, H, must be added, giving the resultant curve, HC.

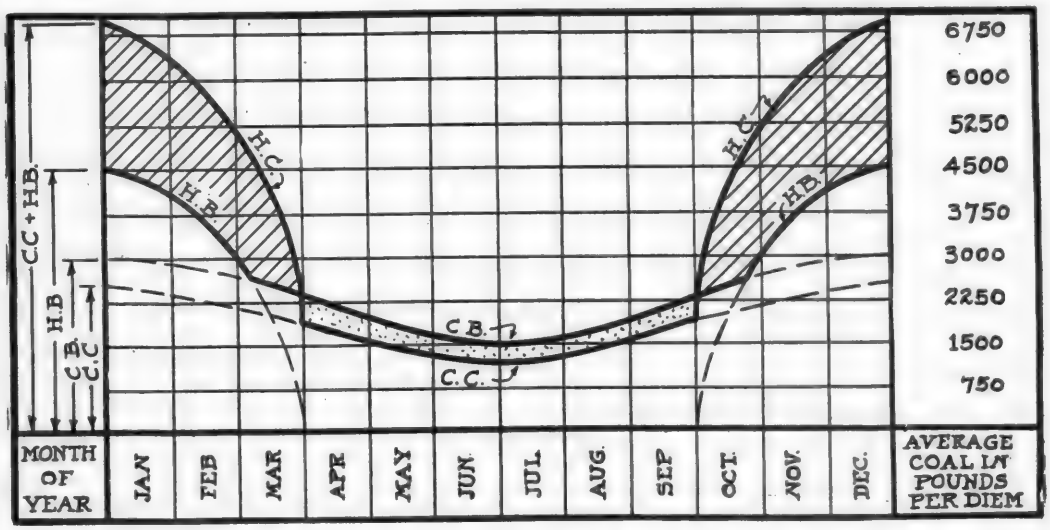


FIG. 3—COMPARATIVE COAL CONSUMPTIONS WITH A BUILDING PLANT AND WITH CENTRAL STATION CURRENT.

The area of the chart below the curves represents the quantity of coal consumed under each proposition and it is self-evident that during the winter the central station service—considering also the coal burned in the building for heating—would result in an increased consumption, since, with the building plant, the daily average would be only HB, while with central station service the daily average would be CC + HB.

On the other hand, during the summer months the chart shows a saving in the daily coal average, due to the increased central station efficiency. The shaded area indicates the winter increase in coal and the dotted area the summer decrease by using central station power. If the total shaded area is greater than the total dotted area, the central plant requires the expenditure of more coal in winter than it saves during the summer and is, therefore, a net loss. If the dotted area exceeds the shaded portions, then the central station saves more in the summer than it requires additional during the winter, and is than accomplishing a net saving.

It is doubtful if the public service companies can deliver at the building at the high efficiency with which they are credited on the chart. If, considering the transmission loss, their overall efficiency at the building drops to a point where it is only equal to the building apparatus at its own switchboard, then the curve, CC, will superimpose on the building curve, CB, the dotted area will be wiped out and the central station has a winter heating loss to overcome with nothing to apply against it.

It would seem, therefore, that with every advantage claimed by the central station advocates, the central station cannot compete against the average combined building power and heating plant on the basis of efficiency. Neither can the central station produce a net saving in coal required during the year (when the heating and power requirements of a building are both considered) even if it can deliver a kilowatt at the building with less coal consumption than if developed in the building.

To sum up, the shutting down of the building plants, instead of making a coal saving, would result in the actual consumption of more coal in every plant operated on a reasonably efficient basis. It has also been shown that the central stations are offenders in the matter of coal conservation in throwing away in their condenser water about 60% of the available heat in every pound of coal burned, which heat is carried off to the river, lake, spray pond, or other cooling means where it is lost as far as heat conservation is concerned.

Space Requirements for Engines.

In the article on "Space Requirements for Engines," which appeared in the March issue in the department on "Power Plant Engineering," it should be noted that all of the engine dimensions given refer to Fig. 1 herewith. Fig. 2 refers to

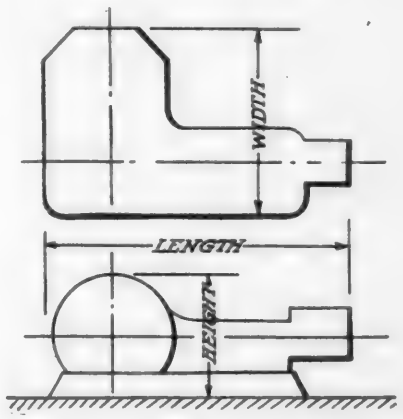


FIG. 1—DIAGRAM OF ENGINE DIMENSIONS FOR USE WITH TABLES IN MARCH ISSUE.

right-hand and left-hand engines mentioned in the same article. These two drawings were inadvertently omitted from the article.

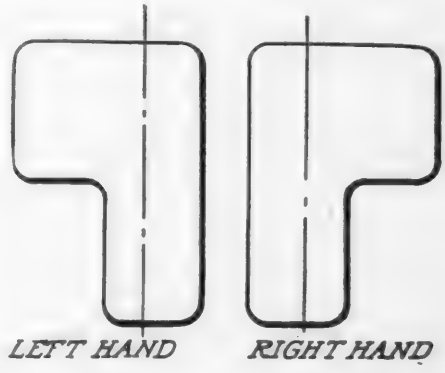


FIG. 2—LEFT-HAND AND RIGHT-HAND ENGINE DIMENSIONS.

To Harness Country's Water Power.

By sweeping majorities 500,000 business executives who comprise the membership of the United States Camber of Commerce have adopted resolutions calling on Congress to make provision for harnessing the millions in water horse power that now run wild.

Americas' Coal Problem in 1918

One of the most important documents, from a practical standpoint, issued by the United States Fuel Administration, is that which appeared early in April, under the title of "America's Coal Problem in 1918." It is written by Fuel Administrator Harry A. Garfield, and states in unmistakable language the warning of the fuel administration that "consumers must buy their winter supply of coal during the spring and summer for storage during the winter if the production is to be maintained at a maximum and the country enabled to avoid a serious coal shortage this winter."

The fuel administration, it is stated, guided by the experience of the past winter, has taken the necessary steps to clear the way for the ceaseless activity of the mines of the country in increasing the supply and for the steady, swift distribution of the nation's fuel as rapidly as it can be taken from the ground and moved over our overburdened transportation systems. The prices fixed by the government for coal at the mine have now been established on a stable foundation which will not be disturbed during the coming year, except in cases of extraordinary urgency. Finally, by carefully-drawn regulations, the fuel administration has insured the shipment of "clean coal" from the mines. Coal containing an undue amount of foreign matter wil be penalized in price and producers who take extraordinary measures in the preparation of their coal will be recompensed.

Through the zone system, which became effective April 1, the movement of bituminous coal between the mine and the consumer will be restricted to the shortest possible transportation lines consistent with the maintenance of an adequate and proper coal supply to all consumers.

Emphasis is laid by Fuel Administrator Garfield that the great storage capacity of the country lies in the bins of the individual consumer and there the country's coal reserve must be built up during the spring and summer when coal production is unhindered and the transportation facilities of the country operating at their highest efficiency. As an inducement to "early buying," the prices of anthracite coal have been reduced 30 cents a ton on all domestic sizes from April 1 to August 31, and in many of the bituminous fields prices have been cut to an even greater extent. To safeguard the consumer the fuel administration has prescribed regulations to prevent profiteering and to govern the distribution of coal by licensed jobbers and by retailers. Each domestic consumer will be permitted to secure a full normal supply of coal, but no more.

New Priorities List for Coal.

In accordance with a new priorities list published by the United States Fuel Administration, for the distribution of coal and coke, certain preferred industries will be given preferential treatment by the fuel administration, including transportation by the railroads. These industries include domestic consumers, plants manufacturing electrical equipment, public institutions and buildings, public utilities, railways, and shipbuilding plants. Automobile plants are not on the list.

Zone System for Distribution of Bituminous Coal.

Beginning April 1, 1918, an announcement of the United States Fuel Administration states that a zone system will govern the distribution of bituminous coal during the coal year beginning on that date. Heretofore coal has been distributed practically without regard to the distance between the mine and the consumer. Under the zone system coal will be distributed to a consuming territory under restrictions that will avoid, as far as possible, waste of transportation facilities, but nevertheless consistent with the maintenance of the greatest possible production and a proper coal supply to all coal users. Every effort has been made however, to preserve long-established trade relations. The actual working of the zone system will be that ordinarily any one section's coal supply will be derived from mines relatively near, thus preventing abnormal and wasteful transportation movements. In this way, eastern coal will be restricted to eastern markets, and the central and western states will be supplied with nearby coal produced in those States.

In addition to the saving in transportation it is estimated that this system will provide

for the possible retention of something like 5,000,000 tons of coal for Eastern States which heretofore has gone west by rail. About 300,000,000 tons of bituminous coal will be regulated by the zone system, or 60% of the total production. Based on this production, there will be saved on the round trip from and to the mines almost 160,000,000 car-miles. This will permit the same cars to make almost 300,000 additional trips from the mines, equivalent to an increase of 5% in the production. Coal for movement on inland waterways is in no way restricted by the system, nor is coal delivered to Canada, which is subject to the regulations of the fuel administrator.

The limitations imposed upon the movement of bituminous coal are given in detail in Publication No. 21, issued by the United States Fuel Administration which also treats, under a separate heading of the "effect of zone system on distribution of bituminous coal by consuming States."

Amount of Coal Saved by Various Economies.

An analysis of the actual amount of coal that can be saved by lighting curtailment, as well as by reducing the indoor temperature from 70° F. to 69° F. and by saving one shovelful per day per family, has been made by Preston S. Millar and presented at a special meeting of the Illuminating Engineering Society in New York, on February 14.

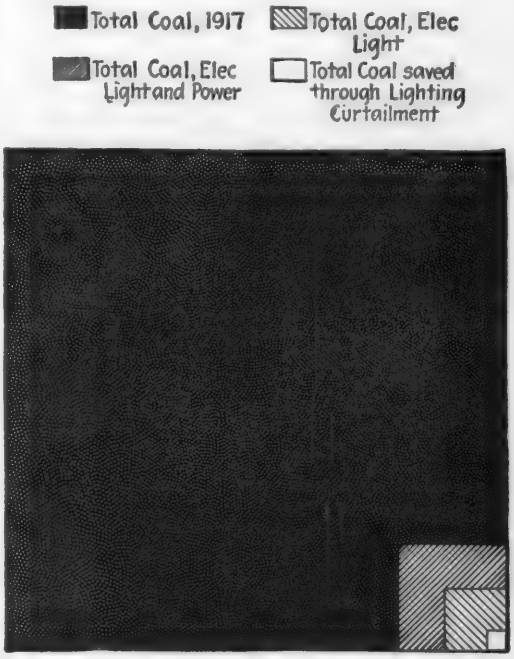
The results of Mr. Millar's analysis are shown in the accompanying charts. The cost of artificial illumination of all kinds, he says, is 0.5 to 2% of the total expenditure of the people. The significant figures to have in mind in discussing this subject are as follows, all being rough approximations: Total coal output of the country, 640,000,000 tons; total employed in production of electric light and power (traction excluded), 36,000,000 tons; total employed for production of light by electricity, 12,000,000 tons. According to these estimates, about 2% of the coal consumption of the country goes into electric light. Fig. 1 gives a graphic comparison between the foregoing figures and the estimated coal saving possible by lighting curtailment. At the same time Mr. Millar emphasizes the desirability of eliminating the unnecessary use of lights.

The adoption of summer daylight saving, as now proposed, is estimated to be capable of reducing the coal consumption of electric central station steam plants by 230,000 tons per annum for the entire country. A suggestion to advance the period of activity by one hour the entire year round, which is now attracting considerable attention, is estimated to afford about the same saving to the public in lighting bills, but to result in a somewhat greater saving of coal on account of the more favorable load factors for the power plants, which would result in the winter months.

The inherent lower efficiency of small plants, together with less expert operation, which in general they receive, is estimated to be responsible for the use of one-third more coal than necessary.

If a proportional amount of coal saving equivalent to 7% of the total electric light produced be assumed, this would mean a reduction in coal consumption of 840,000 tons per annum. This is the maximum extent to which it is believed that the best interests of the public requires coal to be saved through electric-light curtailment. Such a saving compares with other possible annual savings as follows:

Total savings which must be accomplished, 50,000,000 tons; net savings thought desirable through curtailment of electric lighting, 840,000 tons; savings if one degree lower temperature is adopted for building interiors, that is, 69° instead of 70° F., 3,000,000 tons; and saving if each family decreased by one

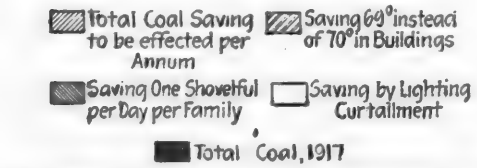


From Power.

FIG. 1—TOTAL COAL PRODUCTION AND COAL CONSUMPTION OF THE COUNTRY FOR LIGHT AND POWER.

shovelful its daily use of coal, 15,000,000 tons. A graphic comparison of these figures is given in Fig. 2.

The saving which is possible in the heating of buildings looms large. Our practice in this respect is to heat buildings to a considerably higher temperature than is done in Europe. The coal which might be saved by operating buildings at temperatures which prevail in Europe, instead of at the temperature which we affect, would be more than the equivalent of the entire consumption of coal in electric lighting. Even the saving of one shovelful of coal per day makes any practical saving through electric lighting curtailment seem very small.


Total Coal Saving to be effected per Annum
Saving 69° instead of 70° in Buildings
Saving One Shovelful per Day per Family
Saving by Lighting Curtailment
Total Coal, 1917

From Power.

FIG. 2—TOTAL COAL PRODUCTION AND COAL SAVINGS BY VARIOUS CURTAILMENTS.

Unique Boiler Selling Campaign.

A selling campaign out of the ordinary has been inaugurated by Pierce, Butler & Pierce Mfg. Corporation for the sale of the Pierce down-draft boiler. According to the company's announcement it proposes to make a cash allowance for old boilers when replaced by the Pierce down-draft heater, very much as automobiles are traded in for new cars.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

Committee to Develop Furnace Code.

In accordance with the action taken at the annual meeting of the heating engineer's society that the society compile a code for warm-air furnace heating, similar to the society's new heating boiler code, President F. R. Still has appointed the following committee to develop such a code:

General chairman, John R. Allen. Design: J. R. McColl, chairman; J. H. Bacon, A. R. Hardy, Roy E. Lynd and William R. Murphy. Installation: E. H. Lockwood, chairman; R. H. Bradley, Frank K. Chew, Frank I. Cooper and S. R. Lewis. Testing: Arthur C. Willard, chairman; F. H. Boomhower, B. H. Carpenter, P. J. Dougherty and M. J. Lide. Code: F. J. Pryor, chairman; John E. Henry, Conway Kiewitz, William W. Underhill and F. W. Williamson.

Changes Being Made in Heating System for Camp Funston.

Some of the changes that have been found necessary in the heating system for Camp Funston, Kansas, were described in a paper on "Heating Army Camps and Cantonments," by B. Natkin, read before the Kansas City Chapter of the heating engineers' society.

As the heating system was originally installed, steam is supplied by a system of overhead mains supported on poles and the condensation from each building has been wasted. It has turned out, however, that the lack of an abundant supply of water, together with its large percentage of scale, has made it necessary to install a return line system to save the condensation. The government has made an appropriation of $150,000 for these lines which are now being installed. They run to a central low point in each unit where the condensation is collected in an electric pump and receiver which, in turn discharges the water into the boilers. "It is quite probable," says Mr. Natkin, "that had the government engineers foreseen the necessity of underground return lines, they might have put the steam lines also underground, as it would have proven less expensive than the present system of overhead lines and underground returns."

As to the general proposition of using

overhead supply lines, Mr. Natkin said that in addition to the advantage that overhead lines are cheaper to install, they can be readily got at for repairs and the material can be obtained more readily. If the lines were laid underground it would have necessitated miles of trenching, suitable underground covering, such as wood log or insulated tile, a parallel return main, with traps, to take off the condensation in the mains, and a drainage system for keeping the line dry. Then there would be the greater difficulty of repair. Mr. Natkin added that the condensation in the overhead line is but very little greater, as installed in the camp, than occurs in an underground line.

STEAM HEATING FOR BARRACKS.

At Camp Funston the barracks are heated by steam, every three or four radiators being connected in a row at the bottom by a 2-in. pipe, in what is known as the railroad system, the steam feeding from one radiator into another. Mr. Natkin stated that the heat loss factors used in estimating the required radiation were: 88 B. T. U. loss per hour per square foot of glass; 24 B. T. U. loss per hour per square foot of exposed wall; 1.43 B. T. U. loss per hour per cubic foot of contents. The loss through the roof was disregarded as there is a dead space 4 in. between the beaver board and the roofing through which the air does not circulate. On this basis the second story of a barrack would require 762 sq. ft. of radiation and 810 sq. ft. was installed. The first story would require 380 sq. ft., and 385 sq. ft. is installed. The entrance hall figures 61 sq. ft. and two radiators containing 40 sq. ft. were installed. The mess hall is heated by six radiators, containing 50 sq. ft. each, while the rule would give 280 sq. ft. as the required amount. The factors of north and west exposures, Mr. Natkin said, were not taken into account in the foregoing figures, as the various barracks have different exposures for the same corresponding side.

New York Chapters Elects New Officers.

Another successful year for the New York Chapter was brought to a close April 15 when the chapter held its annual meeting at the Building Trades Employers' Club, New York. Secretary Obert reported an increase in membership and the treasurer, William J. Olvany, reported a balance at the close the year of $131.00.

The following names were proposed by the nominating committee as officers for the ensuing year, all of whom were elected: President, P. H. Seward; vice-president, Perry West; treasurer, William J. Olvany; secretary, C. W. Obert. Governors: Frank W. Chew, Thomas Chester and W. L. Fleisher.

The subject for discussion was the coal allotment per family, for next winter, with special reference to the preparation of suggestions that could be sent to the United States Fuel Administration and possibly be adopted by the fuel administration. Frank T. Chapman was chairman of the committee in charge of the meeting. He outlined the action taken at the last annual meeting of the engineers' society when a committee was appointed to consult with the Bureau of Mines on the subject of coal allotment. At that time it was suggested that a fair allotment would be ¼ ton per room per month for the three coldest months and 1/5 ton per room per month for the three other winter months. Mr. Chapman said that on further consideration it was now the opinion of the committee that an average of 1½ tons per room per month throughout the six months of the heating season would be a better basis. In this reckoning bathrooms are to be considered as half-rooms, service rooms as half-rooms and halls as single rooms.

Mr. Chapman said all the evidence was pointing to another shortage of coal next winter so that it will be necessary to devise some plans for economizing in coal. If the society does not make concrete suggestions, the fuel administration will proceed on its own basis. He spoke of the present use by the fuel administration of coal cards on which coal deliveries are now being based and stated that while this plan was better than none, it did not offer the best solution of the problem.

In the ensuing discussion it was brought out that the plan of 1½ tons per room is based on New York weather conditions. For other localities a factor would have to be used. Another speaker brought out the point that the number of occupants of a room is a factor and that a distinction should be made in the character of the rooms, since bedrooms would not require as much heat as living rooms. Mr. Chapman stated that the average of 1½ tons took care of this, although it was evident that for very small houses some special rule would have to apply, or else the formula would give such houses altogether too much fuel.

The discussion then turned on the amount of fuel that should be allowed for cooking purposes and Mr. Oaks stated that an average consumption would be 500 lbs. of coal per month for a single-oven range and 700

lbs. for a double-oven range, also 750 lbs. per month for cooking and hot water service for a family of five or more, and 500 lbs. for a family of less than five.

Several suggestions were made as to the need of educating the public in the operation of heating apparatus and one speaker urged that a full set of rules be printed on the card that would be sent out. Mr. Chapman stated that the committee had already considered this and that any recommendations sent to the Bureau of Mines would include the committee's suggestions for a set of rules and that the points brought up at this meeting would no doubt offer further suggestions to the committee..

Eastern Pennsylvania Chapter.

New officers were elected as follows at the annual meeting of the Eastern Pennsylvania Chapter, held March 14, at the Engineers' Club, Philadelphia: President, E. T. Murphy; vice-president, C. V. Haynes; secretary, A. P. Goldsmith; treasurer, H. P. Gant; board of governors: W. G. R. Braemer, J. D. Cassell and M. W. Franklin. A patriotic address on "Our men, over there! their base, over here!" was delivered by Joseph A. Steinmetz.

Fuel Session at Forthcoming Meeting of Mechanical Engineers.

During the forthcoming meeting of The American Society of Mechanical Engineers, in Worcester, Mass., June 4-7, an important session will be devoted to fuel combustion. The fuel session is scheduled for Thursday morning, June 6, at the Worcester Polytechnic Institute, and will be devoted to five-minute presentations of data relating to fuel economy. This session was planned by the fuel conservation committee of the Engineering Council to assist the United States Fuel Administrator in his nation-wide campaign for fuel economy.

The topics to be discussed are: 1. What are the economic defects of impurities in coal? 2. To what extent is fuel oil likely to be used as a substitute for coal? 3. How can soft coal be burned without smoke in marine boilers? 4. What are the possibilities in the direction of the utilization of anthracite wastes? 5. What instruments are useful and desirable in the boiler-room as aids in saving coal? 6. What is essential to the economical operation of hand-fired boiler furnaces when using soft coal? 7. To what kinds of plants and coals are the different types of mechanical stokers respectively adapted, and what is the limiting factor to their use in small plants? 8. What experience have you had in the use of wood as fuel? To what extent is wood available as a fuel? 9. What coal economies can be effected in residence heating? 10. What coal economies can be effected in the small steam plants? 11. What experiences have you had with the storage of coal?

Other subjects on which short papers are desired were "to what extent and where will the gas producer be used to produce economics?" and "What are the new and important devolopments in methods of burning coal?"

Annual Meeting of British Heating Engineers.

In spite of the war, the Institution of Heating and Ventilating Engineers held a successful meeting in London on February 14, at which the new president, Edgar Herring, assumed the chair.

It was announced that elaborate and successful experiments had been carried on at the University College during the year by the institution's research committee, and that the grant of £450 from the advisory council of the government Department of Scientific and Industrial Research had been paid over, while an additional £200 had been contributed by members.

Membership dues in the institution were increased from one to two guineas.

President Herring presented a carefully-prepared paper on "Our Coal Resources, and their Future Economical Utilization, Viewed from the Standpoint of the Heating Engineer." One of the points brought out by Mr. Herring was that the consumption of coal per head of population is 4.72 tons per year in Great Britain, 3.92 tons in Germany and 5.15 tons in the United States. It was pointed out that the climatic conditions in the United States would account for the higher figure for this country so that relatively there is a striking similarity in the net home consumption per head.

Mr. Herring then took up the question of fuel economy in connection with the practice of heating. After citing the well-known causes of fuel losses, including improper design of boilers, installing boilers of insufficient capacity, failure to use draft-regulating appliances, etc., he said that "as heating engineers, responsible for a very appreciable percentage of the fuel consumption of the country, it is necessary to urge upon archi-

tects and others the grave necessity of a careful consideration, from heat-conserving point of view, of the materials to be used and the methods of construction adopted in the erection of all classes of buildings. As engineers it is their duty not only to make themselves acquainted with the transmission coefficients of all kinds of building materials, but also to collaborate with architects in the endeavor to secure the erection of buildings in which the heat loss factor is reduced to a minimum. Every engineer is aware that a factory or workshop with an abnormal amount of glass surface, light roof construction (sometimes corrugated iron only) and comparatively thin walls (often of concrete 4 in. thick) cannot possibly be efficiently warmed otherwise than by the provision of a vast amount of heating surface and the consumption of an excessive quantity of fuel."

Mr. Herring called attention to the failure to make greater use of exhaust steam for heating purposes, as well as for boiling liquids, drying, etc. He said we would be astounded at the waste of fuel involved if we could know the annual thermal value of the steam blown into the atmosphere from innumerable engines, pumps, defective steam traps and similar units. He concluded by advocating that proper facilities be provided at technical schools for qualifying men as certified stokers and that this might be accomplished by a course of instruction in the principles of combustion and the practical firing of boilers.

American Association of Engineers.

A proposed plan whereby all the national engineering societies may co-ordinate their efforts will be one of the things brought up at the annual meeting of the American Association of Engineers, which will be held at the City Club, Chicago, May 14. In a referenda ballot sent out, to be returned in time for the meeting, special attention is called to the proposal of the government to establish an "American Academy of Engineers." A bill to this effect has already passed the United States Senate (S. 2360) and is now before the House (H.RR. 4625).

Acording to the bill the Academy is to be composed in the first place of fifty prominent engineers, the purpose being "to further the interests of engineering, industrial technology and applied science." It is further provided that the Academy shall consist of not more than 200 regular members and that it shall be ready at the call of the government to undertake any examination, experiments, etc., upon any subject of engineering, science, or art, the expenses of which are to be paid by the government. Finally the Academy is authorized to receive donations or bequests up to $1,000,000.

The board of directors of the American Association of Engineers has gone on record as stating that the Academy, under its proposed organization, would amount to "an aristocracy of engineers," as "this bill puts it into the power of a group of men who have attained distinction in the engineering profession, to further glorify themselves and to bring into the charmed circle only the men of their choice. It limits for all time the number of the elect to 200."

Master Steam Fitters to Meet in Chicago.

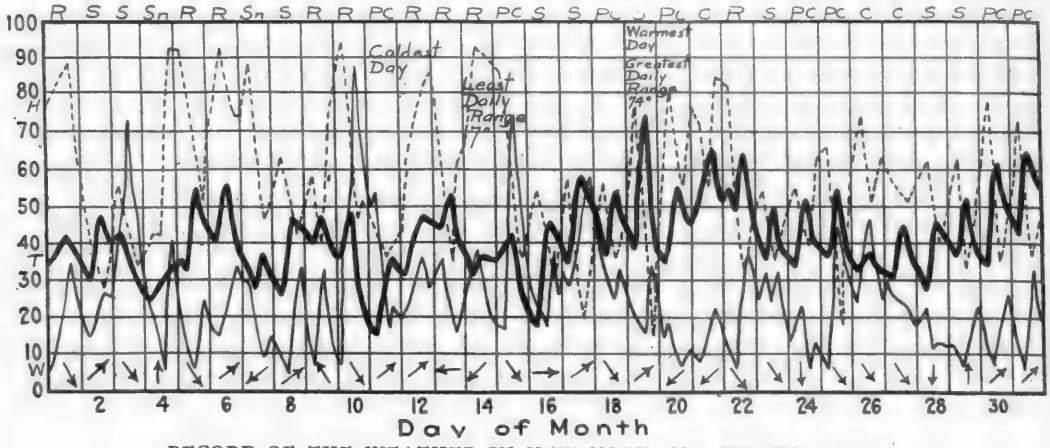
Announcement has been made that the twenty-ninth annual convention of the National Association of Master Steam and Hot Water Fitters will be held in Chicago, June 3-5, 1918. Headquarters will be at the Hotel Sherman where the association met when its convention was last held in Chicago, in 1911. This will be the first gathering of the national association in two years as no convention was held last year.

Bureau of Standards Studies Central Station Hot Water Heating.

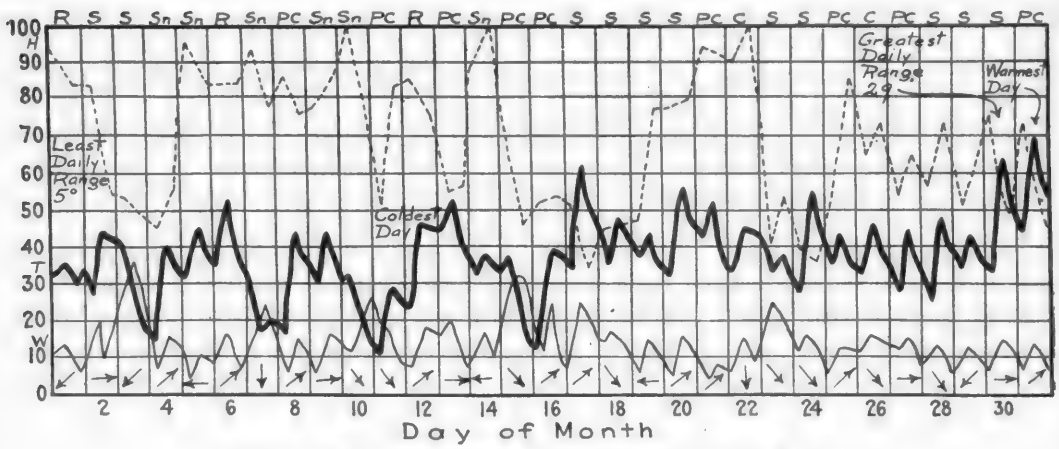
In a report of the activities of the United States Bureau of Standards for the past year, it is stated that the bureau has made studies of central water-heating systems in fifteen cities in the Middle West, for the purpose of formulating technical standards of service for such central heating systems. The work is carried on in close coöperation with the engineers of the Indiana Public Service Commission and with the educational committee of the National District Heating Association. The results will be embodied in a circular entitled "Standards of Service for Central Heating Plants," similar to the circulars already published by the Bureau of Standards on "Standards of Gas Service" and "Standards for Electric Service."

The Weather for March, 1918

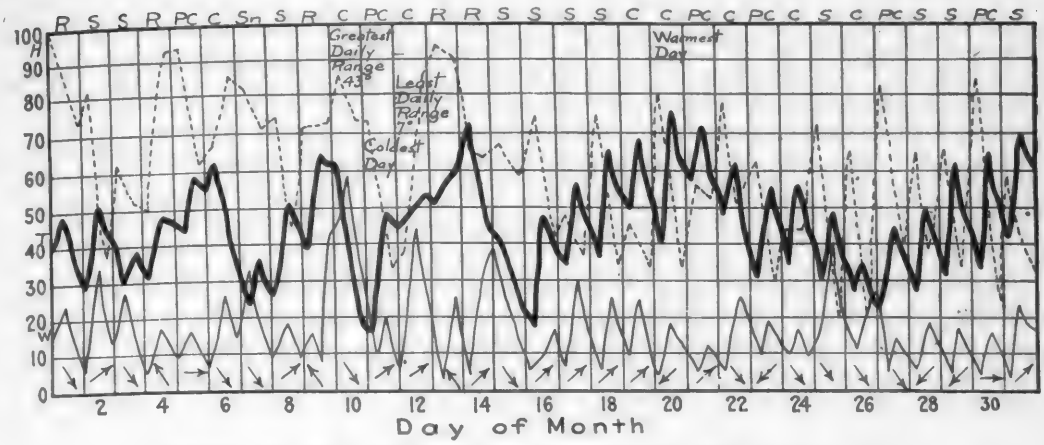
	New York	Boston	Pittsburgh	Chicago	St. Louis
Highest temperature, degrees F.	74	69	75	74	84
Date of highest temperature	19	31	20	21	13
Lowest temperature, degrees F.	16	11	17	18	22
Date of lowest temperature	11	11	11	10	10
Greatest daily range, degrees F.	35	29	43	40	49
Date of greatest daily range	19	30	10	9	9
Least daily range, degrees F.	7	5	7	5	7
Date of least daily range	14	1	12	13	23
Normal temperatur for month, degrees F.	41.2	37	45	42.2	52.6
Mean. normal mean temp. for month, deg. F.	37.5	35	39.5	34.4	43.5
Total rainfall, in.	1.51	3.19	1.25	2.05	0.67
Total snowfall, in.	0.6	12.8	0.5	1.4	
Normal precipitation, this month, in.	4.1	4.08	3.01	2.55	3.43
Total wind movement, miles	14932	8484	9148	9361	10912
Average hourly wind velocity, miles	20.1	11.4	12.3	12.6	14.7
Prevailing direction of wind	N. W.	S. W.	N. W.	S. W.	S. W.
Number of clear days	9	12	11	13	15
Number of partly cloudy days	11	10	6	11	11
Number of cloudy days	11	9	14	7	5
Number of days on which rain fell	9	3	5	8	4
Number of days on which snow fell	2	6	1	3	
Snow on ground at end of month, in.	None	None	None	None	None



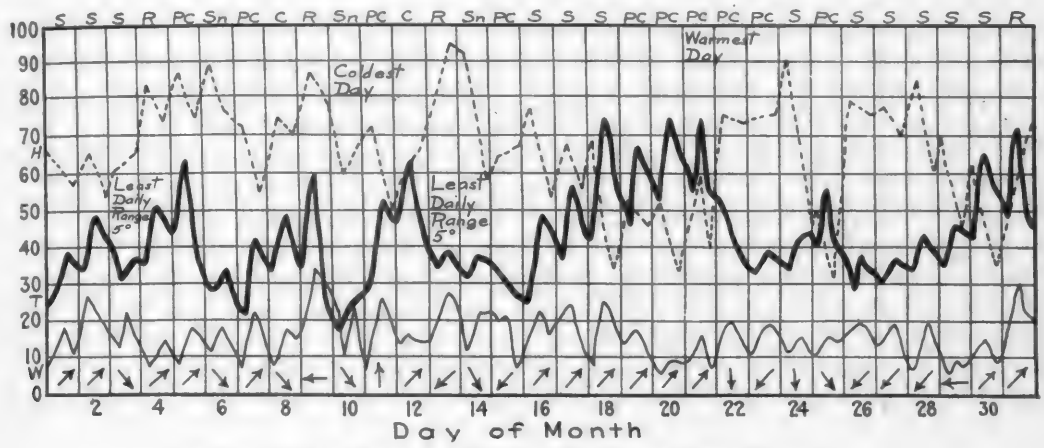
RECORD OF THE WEATHER IN NEW YORK FOR MARCH, 1918.
(Hourly Observations of the Relative Humidity are Recorded on this Chart.)



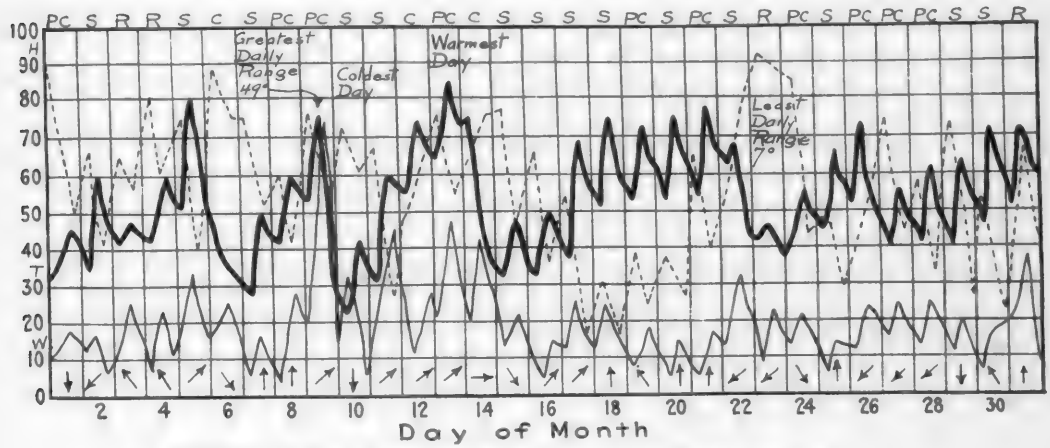
RECORD OF THE WEATHER IN BOSTON FOR MARCH, 1918



RECORD OF THE WEATHER IN PITTSBURGH FOR MARCH, 1918.



RECORD OF THE WEATHER IN CHICAGO FOR MARCH, 1918.



RECORD OF THE WEATHER IN ST. LOUIS FOR MARCH, 1918.

Plotted from records especially compiled for THE HEATING AND VENTILATING MAGAZINE, by the United States Weather Bureau.

Heavy lines indicate temperature in degrees F.

Light lines indicate wind in miles per hour.

Broken lines indicate relative humidity in percentage from readings taken at 8 A. M. and 8 P. M.

S—clear, P C—partly cloudy, C—cloudy, R—rain, Sn—snow.

Arrows fly with prevailing direction of wind.

The War and the Heating Engineer

Call for Trained Men by Bureau of Mines.

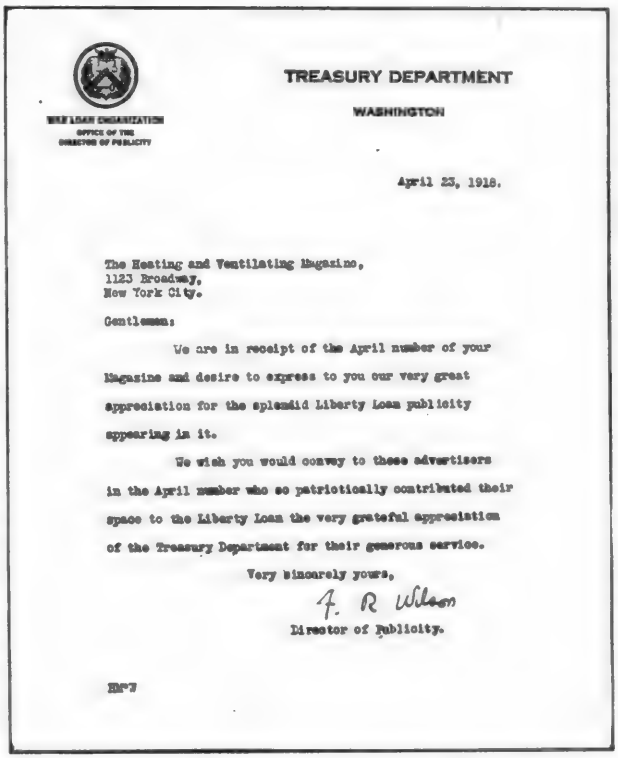
Important chemical and other technical engineering work necessary for the prosecution of the war is being carried on by the Bureau of Mines Experiment Station, at Washington, D. C. The services of trained men of the following classifications are urgently needed:

Bacteriologists	Instrument Makers
Biologists	Laboratory Assistants
Chemists, Inorganic	Laborers
Chemists, Organic	Machinists
Chemists, Physical	Physiologists
Chemists, Electro-	Plumbers
Chemical Engineers	Steamfitters
Draftsmen	Stenographers
Electrical Engineers	Skilled labor of various kinds.

If your training fits you for any of these occupations, send to the Bureau of Mines, American University Experiment Station, Washington, D. C., for blank forms. When properly executed and returned by you, these forms will be placed on file, and when a vacancy occurs you will be considered for it and will be notified if your services are desired.

If you are a registrant in the draft, and have not yet been ordered to camp, it may be possible to have you immediately inducted into the service for work here.

If you are *not* in the draft, but feel that you wish to serve your country in the present crisis, you can enlist, or serve as a civilian.



WAR LOAN ORGANIZATION
OFFICE OF THE
DIRECTOR OF PUBLICITY

TREASURY DEPARTMENT

WASHINGTON

April 23, 1918.

The Heating and Ventilating Magazine,
1123 Broadway,
New York City.

Gentlemen:

We are in receipt of the April number of your Magazine and desire to express to you our very great appreciation for the splendid Liberty Loan publicity appearing in it.

We wish you would convey to these advertisers in the April number who so patriotically contributed their space to the Liberty Loan the very grateful appreciation of the Treasury Department for their generous service.

Very sincerely yours,

J. R Wilson

Director of Publicity.

HF?

MESSAGE OF APPRECIATION FROM TREASURY DEPARTMENT.

Thrift Banks to Aid War Savings.

A thrift bank designed to sell United States thrift stamps automatically has been adopted by the National War Saving Committee. Thrift banks it is stated, will soon be found wherever thrift stamps are sold by authorized agents.

President Urges Preparation in Engineering.

Acting on resolutions submitted by a committee headed by Dean M. E. Cooley of the College of Engineering, University of Michigan, President Wilson has written a personal letter, which appears in the *Michigan Technic* for March, urging preparation in engineering as a means to help fight the war and to help the reconstruction after the war. Dean Cooley states that the attendance in engineering since this country entered the war has fallen off from 25% to 35%. Hardly a day passes without calls from the army or navy for the university's more advanced students. As a result the graduating classes this year will not be more than half their usual size. The Engineer Enlisted Reserve Corps and the Naval Reserve Force, now that they have been established, will no doubt keep in college many who would otherwise go. At the University of Michi-

gan there are between 250 and 300 upper classmen in these reserves, but even that is a small percentage of the usual attendance of 1400 or 1500.

Ordnance Department Still Calling for Inspectors and Engineers of Tests.

Among the urgent needs of the Ordnance Department in the way of inspectors and engineers of tests, the following are given special prominence:

Engineers of tests of ordnance material, inspectors of artillery ammunition, metallurgical chemists, assistant inspectors of cannon (forging operations), assistant inspectors of gun carriages and of gun carriage parts, assistant inspectors of gunfire control instruments, assistant inspectors of motor vehicles, and assistant inspectors of artillery wheels. A list given of plants within a radius of 50 miles of New York City, furnishing artillery ammunition materials for the Ordnance Department, contains no less than 116 such plants.

All of the positions mentioned are under the civil service.

Progress of War-Savings Campaign.

The receipts of the Treasury Department through the sale of War-Savings and Thrift Stamps through February, have equalled $75,000,000. The receipts for the month of February totalled $41,000,000, as against $37,000,000 received through the War-Savings campaign in England for the same period, despite the fact that the campaign has been running there for over two years.

The receipts are coming in to the Treasury Department at the rate of about $2,000,000 a day. In other words, the receipts in this country, after three months, are already running at the same rate which England has reached after two years.

The total receipts in England up to January 26, 1918, were $550,000,000. At the rate at which the campaign is running here, we shall reach this total inside of the year allowed by Congress for the present campaign. If the rate continues to increase as it has been increasing during the past month, there should be no difficulty in attaining the $2,000,000,000 goal set by Congress for the year's campaign.

If the campaign attains the goal set, it will cover the entire cost of the government's ship building programme for the year. Already the government is receiving from the buyers of War-Savings Stamps daily, enough money to build more than 10,000 tons of shipping. It has received, to date, funds for the building of 420,000 tons or 84 ships of 5,000 tons each.

Are You Going or Coming?

Under the heading of "Are You Going or Coming?" what are described as "a few pointed questions," are addressed to American business men by W. M. Hart, advertising manager of *Photoplay*, the matter occupying a full page in the *Chicago Tribune*.

Some of Mr. Hart's points are:

Did you think that you could *embalm* your business for the period of the war and then resusciate it at will? It can't be done.

You cannot wait until after the war to join this select coterie of the men who carried on. You will have to do it *now*. There is no cure for arrested development.

How long do you think your good-will is good for, anyway, if left to itself—even in normal times?

You cannot starve your business and make it win. But you can cut out the frills and *give it nourishment!*

The United States is not going to quit—why should you?

Heating Men in Military Service.

Major J. W. H. Myrick, of the Autoforce Ventilating System, Boston, announces that he has a service flag spread to the breeze at his residence on account of the enlistment of Mrs. Myrick as yeoman in the United States Naval Reserve Force. Mrs. Myrick successfully passed the civil service examination and is stationed at the Boston Navy Yard on special duty.

Sergeant C. T. Sedden, formerly business manager of the Wm. H. Seden Plumbing & Heating Co., Columbus, O., who enlisted in the cavalry for border service, has been transferred to the heavy artillery and is stationed at Camp Stanley, Leon Springs, Texas.

First Lieutenant Wallace J. Pattison, U. S. R. Engineers, a nephew of Major W. M. Pattison, President of the W. M. Pattison Supply Co., Cleveland, O., was one of the survivors of the transport Tuscania, which was torpedoed and sunk off the Irish coast recently.

D. P. Carter, of Kingston, Pa., has received a commission as lieutenant and has

been detailed to the Gunpowder Reservation, in Baltimore.

Oliver E. Willis, formerly with the Vapor Heating Co., New York, has been commissioned first lieutenant in the Ordnance Reserve Corps and has been assigned to active duty with the American Ordnance Base Depot in France.

Theodore W. Little, vice-president of the Walworth Mfg. Co., Boston, Mass., has joined the government forces in Washington where he is responsible for the proper distribution of the mill production in textile materials to the various quartermasters' depots throughout the country.

Camp Utilities Department to Handle Mechanical Equipment.

A utilities department has been established at Camp Grant, Rockford, Ill., to take care of the proper lighting, heating, water supply and ventilation in the camp. The department is made up of 350 enlisted men, with Major Paul Doty in charge of the department.

New York Merchants' Association Establishes Industrial Bureau.

A service to keep manufacturers informed of all government regulations affecting industry, as well as the methods employed by manufacturers to meet the numerous war problems, has been established by the Merchants' Association of New York, and will be known as the Industrial Bureau of the Merchants' Association. It is stated that the bureau will be glad to give information and assistance to manufacturers at any time.

Current Heating and Ventilating Literature.

Under this heading is published each month an index to the important articles on the subject of heating and ventilation that have appeared in the columns of our contemporaries. Copies of any of the journals containing the article mentioned may be obtained from THE HEATING AND VENTILATING MAGAZINE *on receipt of the stated price.*

EVAPORATION

Some General Aspects of Evaporation and Drying. Hugh K. Moore. 4500 w. Met & Chem Eng—Feb. 1, 1918. Serial, 1st part. General theory and practice. 60c.

FUEL SAVING

Fuel Saving in Household Heating. Robert E. Dillon. Ills. 3000 w. Gen Elec Rev—Feb., 1918. Urges efficient management of domestic heating plants. 40c.

CORRESPONDENCE

Suggestions for Research Laboratory in Heating and Ventilation.

EDITOR HEATING AND VENTILATING MAGAZINE:

Realizing the fact that our country at the present moment is engaged in a gigantic task of world-wide importance, appreciating that it requires the sincere and efficient co-operation of all bodies that are in a position to aid the national endeavor, and feeling certain that The American Society of Heating and Ventilating Engineers, as a body, has the will and power to help very materially in the good cause, I will look at the subject of suggestions for laboratory research simply from the national service point of view. I think this is the way the society should look at its proposed research bureau just now.

After the war is over there will be plenty of time and opportunity to investigate along lines of association, or trade, service. Therefore, I would suggest that the first step be an offer of the laboratory service to the United States government for investigations along any specific lines of heat generation, manipulation, utilization, or conservation, as may be desired by the government during the period of the war. If the government cannot use the laboratory advantageously at present, I think it should co-operate with the government as much as possible so that no conflict of opinion may ensue.

Fuel conservation is, presumably, the first and most important problem for investigation. This subject may be divided as follows:

1. Determination of more economical ways to burn both bituminous and anthracite coals so that more heat will become available for useful service.

2. Determination of more efficient means for harnessing the heat given off by the fuel so that less heat will be lost up the chimney and elsewhere.

3. Determination of more effective means or methods for transmitting, with the least possible loss, heat from its source of generation to its destination for utilization.

4. Determination of the most effective means and methods of utilizing heat in an economical way without detriment or injury to health, working capacity, business efficiency or morale of the public.

5. Determination of means of avoiding undue heat loss from buildings of different kinds, and the simple repairs or changes so

essential in many buildings to prevent unnecessary heat loss.

6. Determination of prompt and effective publicity of the information obtained so that the public will be enlightened and millions of coal users put in a position to burn fuel and use its heat in a more economical manner than exists at present.

I do not think the society should cause any research to be made, at this time, along any lines that do not tend to help the government and nation in the present crisis.

Service to the nation is the first call. Service to ourselves as individuals should come after the future security of the nation has been firmly established.

Scranton, Pa. T. N. T.

Three-Store Heating Problem.

EDITOR HEATING AND VENTILATING MAGAZINE:

We enclose you a sketch of three store buildings in the center of a block which have no exposure but front and back. It has been hard to determine exactly how much heating surface is necessary to put in buildings of this class. If you figure the whole surface as exposed, that is, all of it, you usually get entirely too much heating surface. What I wish to know is the safe way of figuring radiation in this class of buildings. You can assume that these buildings have basements underneath and are one or two stories high, as will suit your convenience. Also you can assume the width and length of the building, thickness of the walls, and the glass. I do not see anything in your Data Sheets, or information that has been running through the magazine this past year, that gives any information on buildings situated as these are.

This comes up quite frequently, and there seems to be quite a variation in the amount of radiation figured.

Louisville, Ky. W. C. G. & Co.

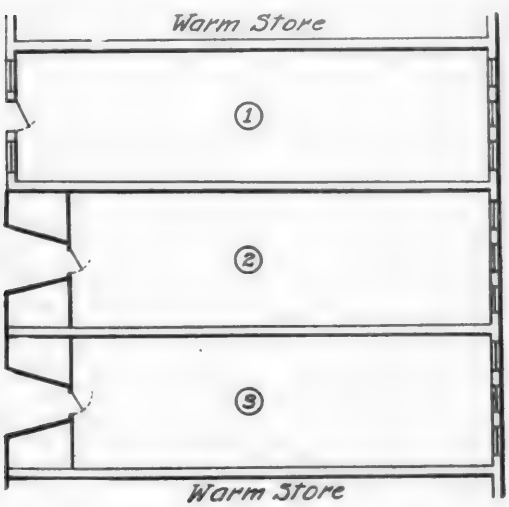


FIG. 1.—PLAN OF THREE-STORE BUILDING SUBMITTED BY CORRESPONDENT.

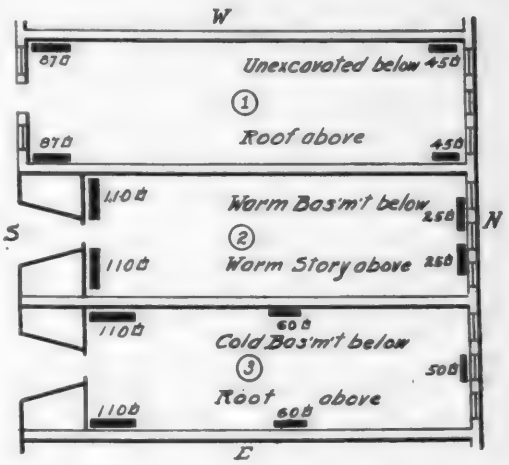


FIG. 2.—ONE METHOD OF HEATING THREE-STORE BUILDING.

Our correspondent's question is one which often puzzles heating men and many good engineers have varying opinions as to how such a proposition should be figured. The sketch as submitted by our reader is shown in Fig. 1 and consists of three stores Nos. 1, 2 and 3, No. 1 having a straight front and Nos. 2 and 3 having set-in vestibules and show-windows of plate glass. The rear wall of each store has three windows and Nos. 1 and 3 have warm stores next to them so that the only exposure is at the front and back.

Our correspondent desires us to figure the radiation for these stores, making our own assumption as to walls, basements, etc. Suppose Store No. 1 has a concrete floor laid on dirt and a plaster ceiling forming a furred-in space immediately below the roof; i. e., No. 1 is a one-story proposition without basement. No. 2, let us assume, is a two-story and basement store, with heat in the basement and story above. No. 3, we will suppose, is similar to No. 1, except that it has a cold basement beneath. Buildings face south, outside temperature—10°, inside temperature 60°; height, 13 ft.; length of stores 58 ft.; width 16 ft.; area of glass, transom and door in front of No. 1, 57 sq. ft.; in rear 45 sq. ft.; area of glass and door in front of Nos. 2 and 3, 308 sq. ft.; in rear, 45 sq. ft.

TO COMPUTE NO. 1:

Front Wall, 12-in. brick.
16 × 13 = 208 sq. ft.
Glass 57 " "

Net Wall 151 " "
B. T. U. for front wall.
60°
—10°

70° temp. diff. glass = 70 (See Standard Data Sheet 1-F)
12-in. brick = 16.1 (See Standard Data Sheet 1-A)

Glass
57 × 70 = 3990 B. T. U.
Wall
151 × 16.1 = 2431 B. T. U.
Leakage 20 ft.
back from wall
one air change:
16 × 13 × 20 = 4160 cu. ft. times factor of 1.27 (See Standard Data Sheet No. 3)
4160 × 1.27 = 5283 B. T. U.

11704 B. T. U. for front wall.

Rear Wall
Total wall:
16 × 13 = 208 sq. ft.
Glass = 45 " "

Net wall 163 " "
B. T. U. Glass 45 × 70 = 3150
B. T. U. Wall 163 × 16.1 = 2744
Leakage 20 ft. back =
16 × 13 × 20 = 4160 cu. ft.
4160 × 1.27 = 5283

11177 B. T. U.
Increase for north exposure,
15% 1676

12853 B. T. U.
total for rear wall.

The roof space (assuming 35° as the lowest temperature and lath and plaster ceiling) has a factor of 21.7 (See Standard Data Sheet No. 1-G) and the total ceiling loss is 16 × 58 × 21.7 = 20137.6 B. T. U.
Placing half of this ceiling loss on the *front* wall gives 11704 + 20137/2 =
11704 + 10069 = 21773 B.T. U.
and for the *rear* wall
12853 + 10069 = 22922 B. T. U.
This gives for the front 21773 ÷ 250 = 87 sq. ft. Doubling for being near door (See Standard Data Sheet No. 13) gives two radiators each of 87 sq. ft. at the front of the store and for the rear 22922 ÷ 250 = 91 sq. ft. or two radiators each of 45 sq. ft. at rear of store.

STORE NO. 2
Front wall
28 × 13 = 364 sq. ft.
Glass 28 × 11 = 308 sq. ft.

Net wall 56 sq. ft.
308 × 70 = 21560 B. T. U.
56 × 16.1 = 902 B. T. U.

Total = 22462 B. T. U.
one air change
20 ft. back
same as No. 1 = 5283 B. T. U.

Total B. T. U. = 27745 for front wall.
Rear wall.
Same as No. 1 or 12853 B. T. U.
This store having a warm ceiling and floor no further additions are required so that the surface at the front will be 27745/250 = 111 sq. ft. and doubling for door gives two radiators of 110 sq.ft. each.
For the rear wall there will be 12853/250 = 51 sq. ft. needed or two radiators of 25 sq. ft. each.

FOR STORE NO. 3
Front wall
B. T. U. loss same as No. 2 27745 B. T. U.
Rear wall
B. T. U. loss same as No. 2 12853 B. T. U.
Ceiling loss same as No. 1 20137 B. T. U.
Floor loss—say ordinary double thick flooring without lath or plaster factor for 35° (See Standard Data Sheet No. 1-G) 10.8
16 × 58 × 10.8..... 10022 B. T. U.
Total loss for front of store is
27745 for wall and glass
10069 for one-half of ceiling
5011 for one half of floor.

42825 B. T. U. ÷ 250 = 171 sq. ft. for front.
Total loss for rear is
12853 for wall and glass
10069 for one-half of ceiling
5011 for one-half of floor

27933 B. T. U. ÷ 250 = 111 sq. ft. for rear.
Doubling the front radiators for door makes too large units to be desirable so that it will give better sizing to put the radiation for the front wall, glass and leakage in the front, the radiation for the rear wall, glass and leakage in the rear and to provide two intermediate radiators to care for the floor and ceiling located in the middle of the store. This gives distribution as follows:
Front wall losses:
27745 B. T. U. ÷ 250 = 111, or two radiators of 110 sq. ft. each after doubling for door.

Rear wall losses:
12853 B. T. U. ÷ 250 = 51 sq. ft.
Floor and ceiling losses:
20137 B. T. U.
10022 B. T. U.

30159 ÷ 250 = 120 sq. ft. in middle of store, or two radiators of 60 sq. ft. each.

Our correspondent's question doubtless relates to the amount of leakage to allow for in large spaces of small exposure. This is a subject on which engineers will differ, but 20 ft. back from the exposed wall is entirely sufficient to cover all ordinary needs. This is based on the fact that in an ordinary room one air change an hour is entirely sufficient for ordinary cases and the average room is very seldom over 20 ft. deep.

On the other hand, if it is desired to warm up the air in a room in a given length of time the heat required for the whole cubic contents must be considered. It is the custom of one engineer when putting in radiators for interior corridors in schools, where there is *no exposure* whatsoever, to put in a radiator sized for one air change per hour so as to heat up these corridors in the morning after they have cooled down over night.

Proper Connections for Pipe Coils.

EDITOR HEATING AND VENTILATING MAGAZINE:

Referring to the article in your March number on "Meeting the High Cost of Heating and Ventilating Apparatus," I offer the following suggestions:

When I commenced business about forty years ago, we used pipe coils almost exclusively except for residences. For circulating coils under 40 ft. long, mitre coils and bracket coils, we fed and returned through a single pipe. The mitre coil, Fig. 1 shown on page 15 could be simplified by using a single connection at the bottom of return tee, doing away with a lot of pipe connections and check valves. I think the mitre coil as shown

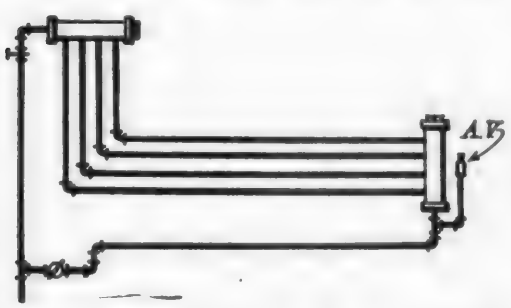


FIG. 1—COIL CRITICISED BY CORRESPONDENT.

would get air bound the way you show it. The supply should be in center of branch tee instead of the end and the air valve in top of the return tee.

The return bend or bracket coil, Fig. 2, should be fed at the bottom and return through same pipe and the air valve placed at the top.

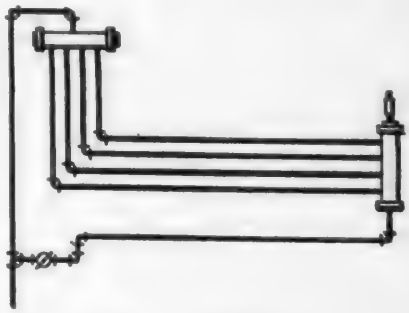


FIG. 1-A.—COIL AS REVISED BY CORRESPONDENT.

We once did a school job, using circulating coils under windows 40 ft. long and indirect box coils 10 pipes high, 4 ft. long, all fed and returned through a single pipe and no returns on the job except at the end of the main supplies in basement. The circulation was perfect. I still have the plans of this job on file.

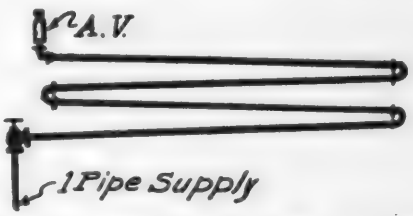


FIG. 2-A.—RETURN BEND COIL AS ADVOCATED BY CORRESPONDENT.

Chicago. L. H. P.

The method of coil connection objected to by our correspondent—who, by his letterhead, is the president of an old firm of heating, ventilating and power plant contractors established since 1877—is shown in Fig. 1 and the proposed change in Fig. 1-A. Owing to our reader's long experience and responsible position we have considered his suggestions most carefully and checked up his scheme with several other authorities, beside the author of the article in question.

We find in Harding and Willard's new reference work on "Heating and Ventilation" p. 96, an illustration of a typical miter wall coil and the pipe connections thereto. This coil is fed from the end of the top manifold

just as originally shown in our article and the air valve is indicated in two positions—one on the top of the return manifold (as advocated by our correspondent) and the other near the bottom of the return manifold (or very close to the point where it was located in the article).

"Modern Engineering Practice," a work of twelve volumes compiled by the American School of Correspondence, gives on p. 62 of Vol. XII a view of a typical miter coil. They also follow the idea of feeding the top manifold at the end and of locating the air valve just above the bottom of the return manifold.

Other authorities show similar connections. In only a very few instances is a manifold with a back outlet even considered and we have seen hundreds of walls coils connected up on the supply end as illustrated in the original article, and they were giving perfect satisfaction. Therefore, while we are inclined to believe that our correspondent's scheme of feeding is perfectly feasible, we cannot admit that the method of feeding shown in the original article is out of line with the very best practice; it certainly shows no indications of any liability to give trouble in operation.

Our correspondent also says he believes a coil so connected would air bind. The only way air binding can be obtained in a coil is by the steam travelling through one or more lines of pipe, reaching the return manifold in advance of the steam traveling by other routes and closing the air valve before the air in the slower operating pipes is expelled. If our correspondent will compare carefully the length of steam travel on the coil originally illustrated he will find that the steam travel from the point where it enters the supply manifold to the point where it leaves the return manifold is *exactly the same length* no matter which pipe is considered, the shorter pipes of the coil requiring the steam to pass through the entire length of both supply and return manifolds. Thus a much more even travel of steam down *all* the pipes toward the air valve is assured and if this travel is at an exactly equal rate all the pipes will be completely rid of air and filled with steam during the same interval of time, thus insuring that at the time the steam reaches the air valve all pipes of the coil are freed of air and properly filled with steam.

With the correspondent's scheme of center feeding at the supply manifold as herein illustrated we believe there would be a great tendency of the entering steam to drive down the middle pipes of the coil due to its entering velocity. While this might not be sufficient to cause serious trouble the tendency would be to heat these pipes first and to shut the air valve before the top and bottom pipes of the coil are blown out.

The only other way steam could get to the air valve, of course, is through the drip connection of the coil and this is exactly the reason of inserting the check at that point so that under no possibility could the coil feed through both pipes or "back-fire" so as to close off the air valve before being fully blown out.

The location of the air valve on the *top* of the return manifold we regard as wrong fundamentally owing to the steam vapor being lighter than the air and always seeking the higher portions of the radiating surface. No one would think of putting an automatic air valve on a radiator at the top for this very reason and we do not believe it is generally considered good practice on coils. On the other hand, the tendency to air bind the coil by locating the air valve in this position may not be serious enough to cause unsatisfactory results; the air valve is most efficient when kept as low as possible.

The return bend coil (originally illustrated in Fig. 2, p. 16, of March issue) as proposed by correspondent, is shown in Fig. 2A and consists of a regular return bend coil supplied at the bottom by a one-pipe steam connection and terminating at the top end in an elbow on top of which is set an automatic air valve. There is no question but that a coil so connected would operate but how satisfactorily is problematical. We are unable to locate any authority who *advocates* such a connection and most heating engineers fight shy of one-pipe coils with manifolds to say nothing of one-pipe return-bend coils. The long travel that the ever increasing quantity of condensation must negotiate before getting out of the small pipe of the coil and into the larger main including pouring down through return bends *against* the flow of steam instead of *with it* makes us very dubious as to this arrangement for general work.

It would be very easy to get a coil wherein the pipe near the bottom would not have sufficient area to permit easy and noiseless passage of the returns flowing back against the steam. For this reason we are of the opinion that while the coil shown in Fig. 2-A, with careful design, could be made to work in a reasonably efficient manner, the flow of the condensation in the coil should be *with* and not *against* the flow of steam. Such a result is obtained with the original Fig. 2, but not with correspondent's suggested Fig. 2-A.

Comparative Cost of Pipe Coils and Radiators.

EDITOR HEATING AND VENTILATING MAGAZINE:

I note with interest in your March, 1918,

issue an artcle on "Meeting the High Cost of Heating and Ventilating Apparatus," in which it is suggested that pipe coils be used instead of radiators.

As contractors, we believe that this is misleading and confusing to the public, taking into consideration the cost of steamfitters' and steamfitters' helpers' wages, the cost of cutting and threading the pipe and the cost of raw pipe itself, and taking into consideration the use of hook plates, screws, manifold headers and the cost of two valves on a supposed one-pipe unit; it is demoralizing in the extreme.

New York City. J. C. W.

We are not quite clear as to just what our correspondent means unless it is that he wants to assert that pipe coils are more expensive to install than direct cast-iron radiation to give equal heating effect. If this is his position we hardly feel that we can agree with him. Of course there is a time, however, when the size of the heating units gets down to such small limits that it would cost more to make up a coil than it would to use a small radiator.

With the unsettled conditions in the labor market at present, it is hard to make a comparison that would be applicable to all parts of the country, but it must be universally recognized that coils were cheaper to use under pre-war conditions as their constant employment in all places where cost superseded appearances amply testifies.

Coils are used almost exclusively in large garages, factories, manufacturing plants, school basements, etc. It is also a well-known fact that cast-iron radiation has increased in cost nearly 150% since the beginning of the war. Therefore, unless steamfitters' wages, the cost of black iron pipe and fittings, hook plates and all the other parts used in coil work have each and every one increased in like proportion the cost of coil work would remain relatively cheaper. We do not believe that on the average such large increases in wages and the cost of pipe, etc., have taken place and, therefore, it hardly seems reasonable to suppose that the pipe coil in large installations will cost relatively more under present conditions than it did formerly. On the contrary, present indications seem to point toward making a greater saving under present conditions than formerly. We should be glad to hear from other contractors in regard to their ideas on this matter.

Novel Method of Enclosing Radiators

EDITOR HEATING AND VENTILATING MAGAZINE:

The January number of THE HEATING AND VENTILATING MAGAZINE duly reached my table and as I have been interested in gathering data on heating standards I turned to examine your latest data sheets. On No. 13 under "Computing Radiation" the statement is made that "Radiators installed so that the air does not circulate freely around them suffer a loss of efficiency and must be increased as follows: Recessed radiators 20%, and concealed radiators 40%."

This agrees with all other data and information I have been able to obtain from text-books and journals and records of tests.

As, perhaps, you know, in a residence it is a great objection to have the radiators exposed as they will cause the dust to blacken the walls and if the radiator is placed under a window it will soon soil the curtains and hangings. About six years or more ago, I designed an enclosure for concealing the radiator under the window, which allowed the air to circulate freely and therefore did not lose in efficiency over a free standing radiator. It also had the effect of so protecting the curtains and drapery that they were not affected in the usual way, with the accumulation of dust. I have been using this method of enclosing for the last six years and have never allowed anything for decreased efficiency but have figured my heat losses and proportioned my radiation to offset the heat losses as usual. I compute my heat losses by Carpenter's rule, using such co-efficients for B.T.U. as in my opinion suit materials used in the construction.

This method of enclosing radiators may be of more interest to the architect than to the heating engineer as it provides a method of attractively installing radiators which the usual heating engineer considers outside of his province.

I enclose a diagram showing the method of enclosing a radiator under a window and under a window seat. Both the window seat and the sill proper remain perfectly cool, and the fact that during the present extreme winter all of my heating systems installed in this way have kept the houses warmed, makes me believe, in view of other tests, that a radiator so enclosed is fully 100% efficient. I think the diagram is self-explanatory, showing the radiator in the usual enclosure with a grille on top through the window sill and one on the face, with the addition of a deflector of sheet metal fastened to the sill as shown and extending over and down about two-thirds at the back of the radiator. This will cause the cold air from the window to drop through the upper grille down back of the radiator, then up through, similar to an indirect radiator, which acts to induce a current of air along the lines of the arrow. The other diagram shows the same arrange-

ment applied to the window seat. Both the window seat, the back and sills remain cool and there appears to be no uncomfortable draft from the window sill, as the air all seems to be drawn down through the grille. This method of installing has been recently adopted by some of the engineers in Detroit with the same success as I have had.

This same scheme worked equally well in sun porches.

Saginaw, Mich. J. F. B.

Our correspondent has submitted a suggestion which should prove of considerable benefit to our readers. Many cases are met

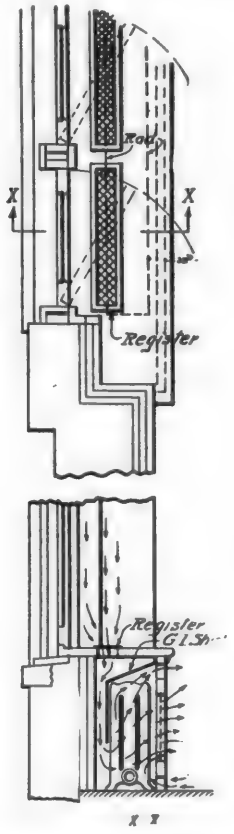


FIG. 1.—CORRESPONDENT'S METHOD OF ENCLOSING RADIATORS.

with in regular heating work where concealment of the radiator is desirable and this is usually accomplished only with some loss of efficiency. A careful consideration of the method of installing used by the correspondent (as illustrated in the plan and elevation shown in Fig. 1) shows that this scheme should produce very good results,—in fact, much better than the common concealed radiator—for the following reasons:

First, the natural tendency of the cold air against the window glass to drop is in this case taken advantage of and facilitated by the radiator action, instead of being counteracted by the upward hot air flow from the radiator.

Second, the air thus striking the radiator direct from the cooling surface of the window is likely to be much cooler in temperature than air circulating around the floor of the room from which the ordinary radiator draws its supply.

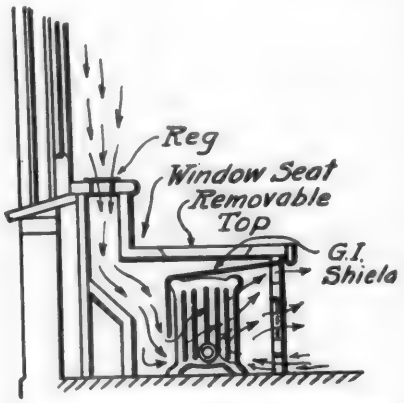


FIG. 2.—CORRESPONDENT'S METHOD OF INSTALLING RADIATOR UNDER WINDOW SEAT.

Where a small window radiator is used with a low seat the seat is provided with a flush cover arranged as shown in Fig. 2. The same theory of operation follows here as in the first case illustrated and the results attained are about the same. Whether or not the correspondent does obtain an equal efficiency with radiators so placed, when compared with those standing out in the open, is doubtful. The fact that without extra allowance these radiators heat the room might only indicate that the method of figuring used is sufficiently safe to allow a slight reduction in radiator efficiency without causing trouble. A condensation test made of two equal-sized radiators, one set out in the open and the other enclosed as shown could, we believe, show a slightly greater efficiency for the exposed radiator.

We thank our correspondent for submitting this suggestion and believe it is a great improvement over the common method of concealing radiators.

Garage Heating.

EDITOR HEATING AND VENTILATING MAGAZINE:

I wish to thank you for your comments and criticism (in April issue) but regret that I did not use more care in explaining the design.

(1) It is, of course, absolutely necessary to have an air valve on the high part of the circulating loop on the basement ceiling and looking up my copy of the sketch submitted to you I find it so noted, which does away with an air-relief pipe.

The radiation was based on the temperature in the garage of 45° F., which, of course, would have some effect on the speed of the circulation. The most radiation was placed in the ceiling coils and in other jobs of similar nature was placed entirely in the ceiling, with no coils whatever near the floor.

Since reading the April number I have talked with the owner of the above job and he advised me that even during this extreme winter the water pipes had not frozen up in his garage and that he had never up to this time found it necessary to open the main valve, which would have allowed full flow.

I wish to say that in our work we have had less complaint in garage work where the coils are placed near the ceiling than when they are placed on the floor. In fact we have one building in which there is 5000 sq. ft. of floor space, four doors, constantly being opened and closed, in which all of the radiation is hung about 30-in. from the ceiling, which is perhaps the most evenly-warmed garage building in the city. This may be accounted for by the fact that the opening and closing of the doors is constantly circulating the air similar to the shafting in cotton mills which equalizes the heat distribution. In my work I have found it impossible to get radiation near the floor and also at the point of the greatest exposure, which always is the door.

(2) In your heat loss co-efficient (Standard Data Sheet No. 1-G) you have the heat loss co-efficients for concrete with cinder fill. Will you kindly advise me what depth this cinderfill is based on? We have for a long time been trying to get the heat loss co-efficients for cinders, but so far have been unable to get anything definite. Your heat loss co-efficients, being given in connection with concerte, does not help us any, as, for a matter of insulation, we might want to pile the cinders 3 ft. deep.

Saginaw, Mich. J. F. B.

In regard to Question (1) we find that air valves were not shown on the original sketch, but it was evident that they should have to be so placed. While it is entirely likely that heating of a character satisfactory enough for a garage might be obtained by the use of ceiling coils alone we are sure that most of our readers will agree with us in the statement that ceiling radiation is not the most desirable arrangement and if the opening and closing of the doors produces sufficient circulation and mixing (as our correspondent states) then it is fair to assume that when the doors are not being opened the heating will be imperfect to a certain extent.

Of course where the space conditions will not permit the locating of radiation at a lower level, the next best thing must be done but if it is possible to place radiation either on the ceiling or the floor it must be conceded that the surface will be more efficient and the results—under equal conditions—more satisfactory if the floor location is used.

In regard to Question (2) the heat loss for a concrete roof slab with "cinder fill," as called for in Data Sheet No. 1-G, undoubtedly refers to a common 4-in. flat concrete roof slab on which the slope and crickets are formed up by the depositing of cinders or cinder concrete at the high points and grading down from the high points toward the low points where the fill disappears altogether. We do not think that it would prove economical to use a cinder fill "three feet" thick for insulation as the additional load thus thrown on the roof would result in added cost of construction so that a hung ceiling or other lighter expedient would be more economical to accomplish the same result. We know of no tests on cinders which would give factors for a fill of 3 ft.

Luminous Paint Instead of Electricity.

A Boston hotel with a large electrical sign, when compelled to cut off its illumination under the recent Fuel Administration order prohibiting such uses of current, had the sign painted with luminous paint, which is said to be a fairly satisfactory war-time substitute.

Location of Thermostat in Ja-Nar' Radiator Covering.

In describing the method of temperature control secured by the Ja Nar' radiator covering, in THE HEATING AND VENTILATING MAGAZINE for February, 1918, it was stated that "this system makes use of a radiator covering made of pressed steel equipped with louvres which are under the control of a thermostat placed in the room and as near the radiator as may be desired." The word, "thermometer" should have been used in placed of "thermostat."

As was brought out further along in the article, the thermostat itself, which controls the opening and closing of the louvres, is placed directly in the housing and forms an important feature of the completed unit, making the unit complete in itself without necessitating connection to any outside operating

agent. The thermostat is placed in the current of the inflowing room air entering at the side of the radiator and, as stated in the article, causes the Sylphon thermostat to travel backward or forward, depending on the temperature, and in so traveling it opens or closes the series of louvres which extend across the face of the covering.

New Type of Multiblade Fan.

To the majority of heating and ventilating engineers and manufacturers of this kind of apparatus, there is, perhaps, no type of fan or blower that has commanded more attention, thought and effort during the past few years, on the part of both engineers and manufacturers, than the multiblade or multivane fan. This fan, it will be recalled, was brought out to meet the demand for a fan that would occupy less space with the same or higher efficiency than the standard steel-plate fan.

It is hardly to be expected that the multivane fan has reached the apex of requirements and efficiency. This is not surprising, however, when it is considered that it required almost a century for engineers and manufacturers to work out and experiment on the proper proportion of wheels for the steel-plate fans before they were brought up to their present state of perfection.

An improved type of multivane fan is now being placed on the market by the Garden City Fan Co., Chicago, which has been perfected, the company states, after long, severe and exhaustive tests under many varied conditions. It is known as the Cycloidal multivane fan. A glance at the illustration will show that the paddles or vanes of the fan are set at an angle (cycloidal) to the shaft, which is their patented feature, and on which the patents have now been issued.

The proper proportion and shape of the vanes have been worked out with great care and, being set at an angle to the shaft, are able to maintain a uniform unrestricted flow of air across the entire width of the wheel. This, it is stated, is necessary to give the maximum efficiency to any multiblade type of fan.

The vanes, in addition to being set cycloidal to the shaft, are curved forward at a predetermined radius to further increase the feed area which makes this new type adaptable to systems where conditions would ordinarily be unfavorable, and where the ordinary multivane fan would not be adaptable.

In mechanical construction, the vanes are rivited to an outer disc which, in turn, is substantially reinforced by angle iron, (in one piece) and the steel spiders which carry the main paddles are cast integral into heavy grey-iron hubs, making it rigid, strong and durable, while at the same time it is somewhat lighter in combined weight than some types of multivane fans, thus decreasing the dead weight friction load on the bearings.

Special care has been taken in the construction of the entire unit to have the fan practically noiseless. Vibration has been eliminated, it is stated, and the manufacturers claim for it the highest efficiency of any multiblade type of fan, while in durability it is rated fully equal to the standard steel-plate fan.

NEW DESIGN OF MULTIBLADE FAN WHEEL

Trade Literature.

MARSH GAUGES, MARSH AUTOMATIC AIR VALVES AND MARSH RADIATOR TRAPS, are brought to the attention of the trade in a circular issued by Jas. P. Marsh & Co., Chicago, Ill., the full line, as given, including those for each service required in the heating or power plant. This company has a

manufacturing record of 52 years, confined to its original patents on gauges, valves and steam specialities. Another circular (No. 34) takes up in detail the Reflux thermostatic traps for use on the return end of radiators or coils of low-pressure, vapor or vacuum systems of heating,; also for any two-pipe heating system, gravity or with mechanical suction on the return line.

COMINS ELECTRO PSYCHROMETER, non-battery type, is featured in a recent circular issued by the American Moistening Co., Boston, Mass. This instrument is especially constructed for long, continuous running and operates directly from any electric light or other current. It is provided with a variable current motor. This permits of "plugging in" at fixed stations where relative humidity readings are regularly required at determined places, as in cold storage or other equipments.

DOVE TAIL FLUE VENTS, made of concrete, is an interesting product of the Pacific Coast Concrete Co., Los Angeles, Cal., and described in newly-issued circular matter. The vents are intended for use in connection with gas heaters. They are made in two sizes, with inside dimensions of 2 in. x 4 in. and 2 in. x 6½ in. They are furnished in straight lengths and in elbow form.

MONARCH METAL WEATHER STRIPS are discussed in a well-prepared catalogue issued by the Monarch Metal Weather Strip Co., Louis, Mo., which presents in an interesting manner the constructive features of this kind of weather-stripping and its application to doors and windows of various types. There is, for instance, a special style for casement windows, as well as the regular style for double-hung windows. Detail views show how these strips are applied in each case. Monarch metal weather strips are made of zinc, bronze and copper and are installed, it is stated, only by men trained by experts in the company's factory, and stationed with the different licensees in various parts of the country. Size 8½x 11 in. Pp. 12.

CENTRIFUGAL PUMPS, showing the latest Wheeler designs, are described and illustrated in a new bulletin (No. 108-B) issued by the Wheeler Condenser & Engineering Co., Carteret, N. J.

HOW TO SAVE COAL is the title of a new engineering bulletin (No. 41), issued by the Bailey Meter Co., Boston, Mass. The bulletin starts out with the statement that "to obtain the best results from a boiler plant it is necessary to know the rate of steam generation from each boiler." It is then shown how the Bailey boiler meter accurately records the steam flow on a uniformly-graduated 12-in. circular chart, reading directly in per cent. boiler rating, or, if desired, in thousand pounds per hour or boiler horsepower. The bulletin discusses the matters of boiler efficiency, combustion, air supply, best condition of fuel bed, air as a fuel, how to measure air, effect of coal, etc. The arrangement of the air flow recorder in the Bailey meter is explained at length, as well as the flue gas temperature recorder. The company makes nine different types and classes of boiler meters. Size 8x10½ in. (standard). pp. 20.

CLARAGE KALAMAZOO SECTIONAL DRYING CABINETS are called to the attention of the trade in new circular matter issued by the Clarage Fan Co., Kalamazoo, Mich. The types shown are especially adapted for drying fruits, vegetables or other food products, as well as drugs, chemicals, etc. Details of the dryer are given, including the small multiblade fan used, the steam heater and the cabinet proper, with its stacks of trays. The manufacturers state that they are also prepared to furnish the equipment for larger installations for drying material of any kind. Size 8½ x 11 in. Pp. 4.

STEAM TABLES FOR CONDENSER WORK, fourth edition, has been published by the Wheeler Condenser & Engineering Co., Carteret, N. J. A complimentary copy, it is stated, will be furnished on request to those in responsible positions who are not yet provided with a copy and who deal with steam and its many problems. Size 4x7 in. Pp. 32.

LITTLE GIANT GAS HEATER is an interesting appliance which could be used as an auxiliary heater for house-heating systems. It is described in circular matter issued by the Little Giant Heater Co., Los Angeles, Calif. As will be noted from the illustration, this heater is intended to be placed underneath the floor of a room, a vent pipe being provided to carry away the products of combustion. It is stated that no gas or fumes can escape into the room as the cast-iron drum of the heater is sealed with asbestos washers and fire cement. It is lighted from a pilot light and operated with a key in the register.

New Publication.

NEW VIEWS OF THE COMBUSTION OF THE VOLATILE IN COAL is the title of Technical Paper 183, recently issued by the Bureau of Mines. It is published under the au-

thorship of S. H. Katz. The paper is one of a series dealing with the volatilization of the hydrocarbons in coal and the burning of the volatile matter in the combustion space of the furnace. The author states that while the reasoning used in the bulletin is necessarily speculative, it is being applied to the study of combustion by the Bureau of Mines.

HAS A "RANK OUTSIDER" ANY LICENSE TO "BUTT IN?" is the title of a readable booklet published by H. C. Winchell, advertising specialist, 20 East Jackson Boulevard, Chicago, Ill., which is devoted to the proposition that the outside viewpoint gives the advertising counselor an advantage over the man whose nose is close to his own work.

Heating System for Camp Bowie.

A heating system, to cost $400,000, is being planned for Camp Bowie, at Fort Worth, Texas. It was expected that work would commence on the system before May 1.

Deaths.

William A. Green, vice-president of the F. W. Lamb Co., Chicago, heating contractors, died of heart disease at his home in that city, March 23. He was 69 years old. Mr. Green had been a member of the Lamb Company for over 30 years.

Mrs. John Trainor, of Baltimore, whose husband is a former president of the National Association of Master Plumbers, and who herself was a conspicuous figure at conventions of master plumbers, died in March at her home in Baltimore.

Hugh J. Barron, one of the founders of The American Society of Heating and Ventilating Engineers and, until recent years, prominently identified with that society, died April 6 at his home in New York. Mr. Barron was an Irishman by birth and had all of the proverbial Irishman's wit and spirit. At meetings of the heating engineers' society the members always knew something unusual was coming when Mr. Barron took the floor. His frankness was equally emphatic, whether in criticism or praise. Mr. Barron considered himself a radical and was prone to take the opposite side in a discussion. One of his remembered hits was made at a meeting of heating engineers, when, after he had gone on record as differing pointedly from the view taken by the other speakers, Professor William Kent obtained the floor and said: "Mr. Chairman, I have not always agreed with Mr. Barron, but on the matter under consideration, I am happy to state that we are for once in complete accord." As quick as a flash Mr. Barron spoke up: "Mr. Chairman, then I am undoubtedly wrong!"

Mr. Barron was for practically all his life engaged in the steam fitting business, being for many years a heating contractor in New York. In later years he acted as salesman for manufacturers of heating apparatus. He was 62 years old.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, OF THE HEATING AND VENTILATING MAGAZINE, published monthly at Cooperstown, N. Y., for April 1, 1918.

County of New York, } ss.
State of New York. }

Before me, a notary in and for the State aforesaid, personally appeared A. S. Armagnac, who, having been duly sworn, according to law, deposes and says that he is the Editor of The Heating and Ventilating Magazine, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August, 24, 1912 embodied in Section 443 Postal Laws and Regulations printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:
Publisher, Heating and Ventilating Magazine Co., 1123 Broadway, New York.
Editor, A. S. Armagnac, 1123 Broadway, New York.
Managing Editor, None.
Business Manager, Gustave Petersen, 1123 Broadway, New York.

2. That the owners are. (Give names and addresses of individual owners, or if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.)
Heating and Ventilating Magazine Co., 1123 Broadway, New York.
A. S. Armagnac, 1123 Broadway, New York.
Gustave Petersen, 1123 Broadway, New York.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are:
None

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustee, hold stock and securities in a capacity other than that of a bona fide owner and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

A. S. ARMAGNAC, Editor.

Sworn to and subscribed before me this 4th day of April, 1918.
Arnold F. Smith,
Notary Public, Queens County, No. 2073.
Cert. filed in N. Y. County,
County Clerk's No. 575.
N. Y. County Register's No. 9452.
(My term expires March 30, 1919.)

SIZING DUCTS AND FLUES

METHOD NO. 3.

(U. S. Gov.)

The United States Government employs a method based on using the same velocity throughout the ducts, with modifications, reducing velocity beyond the center of distribution and increasing it before the center is reached. This method consists of reducing the size of the fan outlet to an equivalent number of 1-in. pipes and dividing this equivalent number of 1-in. pipes by the amount of air handled per minute; this gives a decimal by means of which the area of any duct is obtained by multiplying the cubic feet of air per minute carried by this decimal.

TABLE 1—CALCULATIONS ACCORDING TO U. S. GOVERNMENT METHOD.

Cubic Feet per Min.	Distance Ft.	Add for Turns Ft.	Equivalent Distance Ft.	Cubic Feet Times Lineal Feet
Two of 1500 ea.	20	—	20	60,000
Two of 1500 ea.	40	—	40	120,000
Two of 1500 ea.	60	—	60	180,000
1500	100	—	100	150,000
1500	120	—	120	180,000
1500	140	—	140	210,000
1500	160	—	160	240,000
Two of 1500	100	50 (a)	150	450,000
Two of 1500	120	50 (a)	170	510,000
Two of 1500	140	50 (a)	190	570,000
				2,670,000

(a) Assumed at 30 in. diameter and 10 diameters for throat radius equal to 1D.

Then multiplying the cubic feet at each outlet by the distance back to the fan, adding the totals and dividing their sum by the total cubic feet of air per minute will give the number of feet to the center of distribution from the fan. One-third of 1% is added for each foot beyond this center and ⅓ of 1% subtracted for each foot less than this center. The velocity in the vertical flues is 600, and 200 ft. per minute through gross area of register face.

Thus, referring to Fig. 1 the outlets starting from the fan are as shown in Table 1.

2,670,000÷24,000=111 ft.

This is so near 110 ft. that 110 ft. may be taken for the sake of even figures. Then corrections on areas will be as shown in Table 2.

TABLE 2—CORRECTIONS ON AREAS.

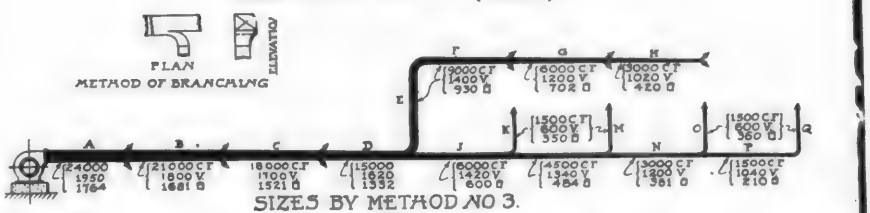
Duct Supplying Outlet or Flue.	Center of Distribution, Ft.	Outlet Distance, Feet	Feet	Correction Factor	Per-Centage
A	110	20	—90	0.0033	—0.30
B	110	40	—70	0.0033	—0.23
C	110	60	—50	0.0033	—0.17
D	110	80	—30	0.0033	—0.10
EF	110	150 (a)	+40	0.0033	+0.13
G	100	170 (a)	+60	0.0033	+0.20
H	110	190 (a)	+80	0.0033	+0.27
J	110	100	—10	0.0033	—0.03
L	110	120	+10	0.0033	+0.03
N	110	140	+30	0.0033	+0.10
P	110	160	+50	0.0033	+0.16

(a) 50 ft. added as equivalent for two 90° bends.

(Continued on Sheet No. 10-P.)

SIZING OF DUCTS AND FLUES

METHOD NO. 3 (Con'd)



SIZES BY METHOD NO 3.

To get size of fan discharge and, therefore, the size of duct at the fan the size of fan must be first computed by the formula:

Cubic feet of air per minute = AD^3N.
A = 0.42 for air washer and ventilation fan.
C. F.M. = 24,000.
Tip speed of steel plate fan with air washer = 4,500.

Outlet at End of Duct	Air for Outlet C.F.M.	Equivalent 1"-D Pipes at 1500 ft/min	Correction %	Correction 1"-D Pipes	Total Pipes for Outlet	Total Pipes for Duct	Size of Duct	Area of Duct Sq. In.
A	3000	1428	-.30	-426	1002	11460	42x42	1764
B	3000	1428	-.23	-328	1100	10458	41x41	1681
C	3000	1428	-.17	-243	1185	9358	39x39	1521
D	No Out.	–	–	–	–	8173	36x37	1332
E	No Out	–	–	–	–	5140	30x31	930
F	3000	1428	+.13	+186	1614	5140	30x31	930
G	3000	1428	+.20	+285	1713	3526	26x27	702
H	3000	1428	+.27	+385	1813	1813	20x21	420
J	No Out	–	–	–	–	3033	24x25	600
K	1500	714	-.03	-21	693	–	–	360
L	No Out	–	–	–	–	2340	22x22	484
M	1500	714	+.03	+21	735	–	–	360
N	No Out	–	–	–	–	1605	19x19	361
O	1500	714	+.10	+71	785	–	–	360
P	No Out	–	–	–	–	820	14x15	210
Q	1500	714	+.15	+106	820	–	–	360

*Note.. At 600 velocity or $\frac{1500}{600}$ = 2.48 or 360 sq in

BASIS OF COMPUTING SIZES OF DUCTS AND FLUES, METHOD NO. 3

Therefore, $\frac{4500}{\pi D} = N$, or

$\frac{1430}{D} = N.$

$C.F.M = 0.42\ D^3 \frac{1430}{D} = 0.42$

$D^2 \times 1430 = 600.60\ D^2$ and

$D^2 = \frac{C.F.M.}{600}$ or $\frac{24000}{600}$

$D^2 = 40$ and $D = \sqrt{40} = 6.3$ say 6-ft. wheel, or a 120-in. fan.

A 6-ft. wheel at 4,500 ft. per minute tip velocity equals:

$6 \times 3.14 \times N = 4500$
$18.84\ N = 4500$
$N = 4500 \div 18.84 = 238$

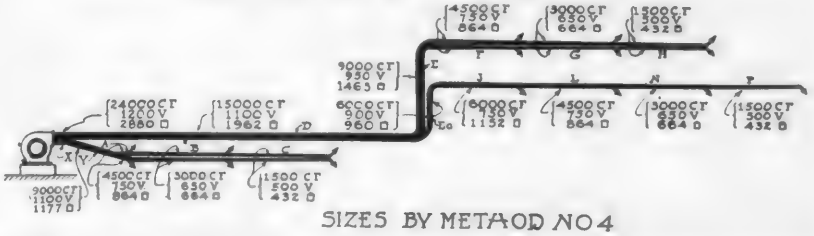
A 72-in steel plate fan wheel has housing 57% of diameter of wheel, or 72 x 0.57 = 41.04 in. say 42-in. housing and 42 in. x 42 in. outlet. Then the duct size at the fan will be 42 in. x 42 in., or equivalent to 11432 1-in. square pipes.

11432 ÷ 24000 = 0.476 factor.

In making branches the practice in this system is to make the branch the full height of the main, regardless of how narrow this makes the branch, put on the elbow, then transform into a circular or square duct as desired. This is illustrated by the detail of branch shown. The basis of computing the sizes of ducts and flues as shown is given herewith and can be readily followed.

SIZING OF DUCTS AND FLUES—METHOD NO. 4

(New York City Board of Education)



Note.—For explanation and example assumed see Standard Data Sheets Nos. 10-M. and 10-N.

In the New York City schools still another method is used. Here the outlets for any one section of a given floor are taken from a duct run horizontally on the ceiling of that floor, the duct being supplied from a main vertical flue, the bottom of which is kept as close to the supply fan as the exigencies will permit. Between the fan and the flues a velocity of 1,000 to 1,200 ft. per minute is maintained and, in the flues, a velocity depending on the height of the flue. The ducts running along the ceilings of the upper floors are arbitrarily graduated from 375 at the farther end up to 750 near the supply flue. In order to supply the sixteen outlets under consideration the duct and flue system would be rearranged as shown so that each floor would be supplied from a horizontal duct located on the ceiling of that particular floor.

The vertical flues are assumed at velocities as follows: 5-story, 1100 F. P. M.; 4-story, 1050 F. P. M.; 3-story, 1000 F. P. M.; 2-story, 950 F. P. M.; 1-story, 900 F. P. M.

SIZING CEILING DUCTS.

Number of Rooms at 1500 cu. ft. each.	Total Cubic Feet per min.	Horizontal Velocity Feet per min.	Area of Duct, Sq. In.
7½	11,250	750	2160
7	10,500	750	2016
6½	9,750	750	1872
6	9,000	750	1728
5½	8,250	750	1584
5	7,500	750	1440
4½	6,750	750	1296
4	6,000	750	1152
3½	5,250	750	1008
3	4,500	750	864
2½	3,750	700	771
2	3,000	650	664
1½	2,250	600	540
1	1,500	500	432
½	750	375	288

Registers at 250 ft. velocity over gross area.
This gives duct and flue sizes about as follows:

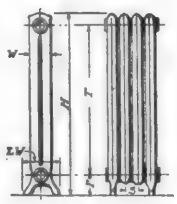
DUCT AND FLUE SIZES

Duct or Flue	Length	Cubic Ft. per Min.	Velocity Feet per Min.	Area Sq. In.
X	Immaterial	24,000	1200	2880
Y	Immaterial	9,000	1100	1177
A	Immaterial	4,500	750	864
Aa	Immaterial	4,500	750	864
B	Immaterial	3,000	650	664
Ba	Immaterial	3,000	650	664
C	Immaterial	1,500	500	432
Ca	Immaterial	1,500	500	432
D	Immaterial	15,000	1100	1962
E	Immaterial	9,000	950	1463
Ea	Immaterial	6,000	900	960
F	Immaterial	4,500	750	864
Fa	Immaterial	4,500	750	864
G	Immaterial	3,000	650	664
Ga	Immaterial	3,000	650	664
H	Immaterial	1,500	500	432
Ha	Immaterial	1,500	500	432
J	Immaterial	6,000	750	1152
L	Immaterial	4,500	750	864
N	Immaterial	3,000	650	664
P	Immaterial	1,500	500	432

The registers are figured at 250 ft. per minute velocity over the gross area and, as wire grilles are used, this is practically 250 ft. per minute across the net area, too. The reason for two ceiling ducts apparently paralleling each other is to prevent the open windows on one side of the building from blowing the air across the duct into the other side. In reality these two ducts consist of a single duct with a middle partition.

H. B. SMITH CO.'S PRINCESS ONE-COLUMN RADIATORS FOR STEAM AND WATER.

Sections	Total Length ft	Total Length in.	HEIGHT, INCHES 45	37	31	25	22	19
			5 ft. per sec.	4 ft. per sec.	3½ ft. per sec.	3 ft. per sec.	2½ ft. per sec.	2¼ ft. per sec.
3	0	10	15	12	10½	9	7½	6¾
4	1	1	20	16	14	12	10½	9
5	1	4	25	20	17½	15	13½	11¼
6	1	7	30	24	21	18	15¾	13½
7	1	10	35	28	24½	21	18⅜	15¾
8	2	1	40	32	28	24	21	18
9	2	4	45	36	31½	27	23⅝	20¼
10	2	7	50	40	35	30	26¼	22½
11	2	10	55	44	38½	33	28⅞	24¾
12	3	1	60	48	42	36	31½	27
13	3	4	65	52	45½	39	34⅛	29¼
14	3	7	70	56	49	42	36¾	31½
15	3	10	75	60	52½	45	39⅜	33¾
16	4	1	80	64	56	48	42	36
17	4	4	85	68	59½	51	44⅝	38¼
18	4	7	90	72	63	54	47¼	40½
19	4	10	95	76	66½	57	49⅞	42¾
20	5	1	100	80	70	60	52½	45
21	5	4	105	84	73½	63	55⅛	47¼
22	5	7	110	88	77	66	57¾	49½
23	5	10	115	92	80½	69	60⅜	51¾
24	6	1	120	96	84	72	63	54
25	6	4	125	100	87½	75	65⅝	56¼
26	6	7	130	104	91	78	68¾	58½
27	6	10	135	108	94½	81	70⅞	60¾
28	7	1	140	112	98	84	73½	63
29	7	4	145	116	101½	87	76⅛	65¼
30	7	7	150	120	105	90	78¾	67½



DIMENSIONS

H = Total overall height.
T = C. to C. of tappings.
F = Floor to center of bottom tapping.
W = Width of radiator—7 in.
LW = Width of radiator legs—7 in.
S = Width of radiator sections—3 in.

Nominal Height of Radiator	45-in.	37-in.	31-in.	25-in.	22-in.	19 in.
H	45	37	31	25	22	19
T	38 1/2	29 15/16	24 5/16	18 3/8	15 3/8	12 3/8
F	4 5/8	4 5/8	4 5/8	4 5/8	4 5/8	4 5/8

Push nipple at bottom for steam; push nipple at top and bottom for water.
Length given includes bushings.

Note: For legless radiators deduct 3 in. from H.
For extra high legs add 1 in., 2 in., 3 in., or 4 in., to H. and F.
On all radiators extra high legs are special.

TAPPING DATA

All radiators are tapped 2in. and bushed as follows.

SYSTEM	Size of Radiator Square Feet	Supply In. Diam.	Return In. Diam.
Steam, one-pipe	Up to 30	1	.....
	Over 30 up to 60	1 1/4	.....
	Over 60 up to 120	1 1/2	.....
	Over 120	2	.....
Steam, two-pipe	Up to 50	1	3/4
	Over 50 up to 120	1 1/4	1
	Over 120	1 1/2	1 1/4
Water	Up to 50	1	1
	Over 50 up to 120	1 1/4	1 1/4
	Over 120	1 1/2	1 1/2

All air valve tappings are 1/8 in, those for water radiators being set at top.
All tappings with R. H. threads unless otherwise ordered.

TRADE AND MISCELLANEOUS NOTES

Coming Events.

June 4-6, 1918.—Annual convention of the National Association of Master Steam and Hot Water Fitters, in Chicago. Headquarters at the Hotel Sherman. (No convention of the association was held last year).

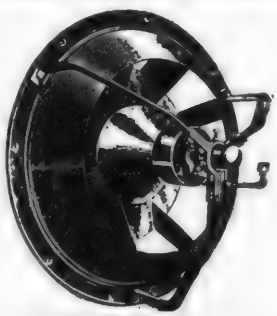
June 4-6, 1918.—Annual convention of the National Association of Master Plumbers, in St. Louis. Headquarters at the Planters Hotel.

June 26-28, 1918.—Midsummer meeting of the American Society of Heating and Ventilating Engineers, in Buffalo, N. Y.

Miscellaneous Notes.

Chicago, Ill.—A new variety of coke, made from Illinois and Indiana coal, is being tested in the furnaces of the Willoughby Building's heating plant. According to the results already secured, this fuel may be used to solve the city's smoke problems, under the Garfield ruling of "no smokeless coal."

Portland, Me.—The twelfth annual dinner of the Plumbing, Steam and Sheet Metal Salesmen's Association of Maine, was held at Riverton Park Casino, Portland, March 11, and was the occasion of a rolicking reunion of New England representatives of the trade. New officers were elected as follows: President, Herbert S. Wakely, Bangor, of H. W. Johns-Manville Co., New York; first vice-president, D. J. Dever, New York, of E. B. Badger & Sons Co., Boston; second vice-president, George H. H. Lawton, Portland, of Portland Stove Foundry Co.; third vice-president, Joseph E. Herrick, Beverly, Mass., of the National Radia-



DUPLEX CONE FAN
Belt Driven

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Ventilating Engineers and Contractors
MANUFACTURERS OF
BLACKMAN and DUPLEX CONE FANS
which are installed by us complete with **Motors, Duct Work** and **Wiring.**

Aligning, Rigging and **Hoisting** done, with labor thoroughly qualified from long experience.

We make a specialty of **Kitchen Exhaust** work. Prominent buildings, hospitals, theatres, and private residences are among our many and recent installations.

The **Duplex Cone** Fans are semi-conoidal fans, made especially to operate against pressure in duct systems.

The **Blackman** Fans are used for fresh air delivery and in duct systems, when no great pressure is involved.

You can have the advantage of our experience.

SEND FOR CATALOGUE

BLACKMAN FAN
Direct Connected to Motor

Carrier Equipped

buildings for **Public—Industrial**—and **Office** use are

COOL IN SUMMER
WARM IN WINTER

and have an abundant supply of pure, fresh air all the time.

Other systems may be cheaper—other guarantees may be higher—but **results** are what count. And to be sure of getting the **best results** specify

CARRIER

There is no equal.

Shall we send our engineer —or catalog 13-36?

Both are waiting to tell you WHY.

CARRIER AIR CONDITIONING COMPANY OF AMERICA
Buffalo, N. Y.

New York Boston
Chicago Philadelphia

tor Co., Johnstown, Pa.; treasurer, A. M. Rosebrooke, Portland, of the Gurney Heater Mfg. Co., Boston; financial secretary, R. C. Parter, of the Smith & Abott Co., Portland; recording secretary, Eugene H. Winslow, of Winslow & Co., Portland.

New York Heating and Ventilating School held its annual dinner March 18 at the Building Trades Employers' Club, New York. C. A. Fuller, the instructor of the class, stated that about 60 of the former students are now in military service. Other speakers were Frank K. Chew, Walter S. Timmis, James A. Donnelly, George A. Schmidt and E. Erickson. Mr. Timmis extended an invitation to those present to become affiliated with the heating engineers' society He spoke particularly of the remarkable work being done for the government by the society's committee on submarine ventilation, the high value of which would be fully appreciated when the details are finally permitted to become public. M. J. Sage acted as toastmaster

Cleveland, O.—50,000 new homes are urgently needed in Cleveland to house the increase in population due to war industries, according to an announcement made at a recent meeting of the Cleveland Chapter of the American Institute of Architects. The necessary funds to solve the housing problem will be appropriated shortly, it is expected, by the government.

Signs of increased building activity are reported by the *American Contractor*, of Chicago. Among recent new projects that have been started is the construction of 300 tenant houses in Detroit by Theodore H. Eaton, to cost from $25000 to $3000 each, and the construction of 50 cottages at Waukegan, Ill., to cost $2500 each. The White Company is building a $500,000 factory in Cleveland. In St. Louis a $200,000 store building is being constructed by the S. S. Kresge Co. Among contemplated building operations are a $400,000 high school building in Erie, Pa.; a $500,000 high school in Rochester, N. Y.; and a $100,000 school in Clairton, Pa. In addition, a $2,000,000 ship building plant is planned by the Curtis Bay Ship Building Co., to be located at Curtis Bay, Md.

Hibbing, Mont.—Charles Foster, formerly manager of the St. Paul office of the Charles L. Pilsbury Company, has been appointed general superintendent of all the public utilities in Hibbing.

H. C. Winchell, Chicago, Ill., advertising agent, announces the removal of his offices to 20 East Jackson Boulevard.

Dodd-Dubosque Co., Inc., New York, has succeeded the advertising agency of J. D. Barnhill, Inc., at 110 West 34th Street. The company engages in business invest,-gations, sales plans and advertising.

John Morton, of the Johnson Service Co., New York, addressed the New York Engineers' Protective Society, at its meeting in the Bloomingdale Building, April 20, on "Thermostatic Control of Heating and Refrigerating." His address was illustrated by lantern slides illustrating the various types of thermostats and their construction features.

W. E. Clow, Sr., president of James B. Clow & Sons, Chicago, acted as chairman of the sub-committee of the Liberty Loan Committee for Chicago and vicinity.

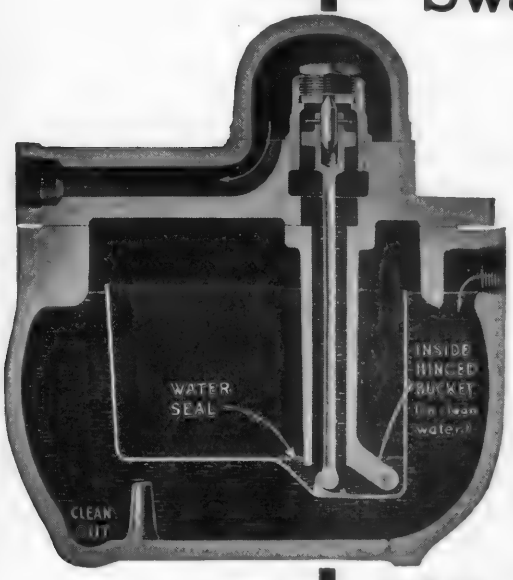
National Metal Trades Association has changed the name of its official publication to the Open Shop Review. The association held its annual convention in New York, April 24 and 25, at the Hotel Astor.

New York State Industrial Commission has published a booklet of proposed rules relating to mines and quarries which were to be the subject of public hearings early in May. In connection with the proposed rules for the ventilation of mines, it is provided that "the operator of every mine, whether operated by shaft, slope, tunnel, adit level, or drift, shall provide and maintain for every such mine a good and sufficient amount of ventilation for such men and animals as may be employed therein, and shall cause an adequate quantity of pure air to circulate through and into all the shafts, winzes, levels, and all the working places of such mine.

"*Note:* It is strongly recommended that the recommendations as prepared by the Bureau of Mines from time to time be followed." Copies of the circular may be obtained on application to the Bureau of Industrial Code, 230 Fifth Avenue, New York.

American Gas Institute and National Commercial Gas Association have completed plans for the amalgamation of the two associations. The new organization will be known as the American Gas Association. Officers will be elected and the organization completed at a meeting to be held in the Engineering Societies Building, New York, June 3.

Building Operations for March, 1918, continue to reflect the changes that have come about due to the state of war. The figures for 117 cities, as compiled by the *American Contractor, Chicago,* total $38,044,182, as com-



Swartwout *Hydromatic*

STEAM TRAPS

pay big dividends

Coal is too scarce and high priced to waste. Even a little steam waste runs into a big amount of coal.

At 100 lbs. pressure, enough steam will escape through an aperture of 1/10 of 1 sq. in. in a ten-hour day to equal 845 lbs. of coal. At $4.00 a ton this amounts to $1.69 a day. This means 21,125 lbs. of coal a month or $42.50. You can't afford to have this waste.

Install Swartwout Hydromatic Traps and stop all waste. Every coil, every heater, every place where steam can waste must be trapped. Swartwout Hydromatic Traps are simple in construction, positive in action, and discharge nothing but water.

A folder giving complete specifications is yours for the asking

THE OHIO BLOWER CO.

9211 Detroit Avenue, Cleveland, Ohio

pared with $84,842,307 for the corresponding period in 1917. It is to be remembered, of course, that these figures do not cover the enormous government construction work which would easily swell the total above that of March, 1917. Cleveland is the largest city showing a marked increase, the gain being due to two permits, one for a $600,000 building, issued to the Cleveland Electric Illuminating Co., and one for a $525,000 structure of the Division of Light, City of Cleveland. Washington, D. C., shows a 25% gain. New York City dropped from $14,340,636, a year ago, to $5,352,248, while Chicago dropped from $11,519,650, to $2,529,650.

Central Station Heating Notes.

Springfield, Ill.—Objections raised by the city of Taylorville to the meter rates charged by the Central Illinois Public Service Company, of Mattoon, for steam heating service in Taylorville, have been the subject of hearings before Frank G. Ewald, chief engineer for the State Public Utilities commission. The city also questioned the power of the utilities commission to order meters substituted when the company has a franchise from the city of Taylorville fixing flat rates for steam heating. Both sides were directed to file briefs.

HIGH EFFICIENCY TRADE ILG MARK VENTILATING MACHINERY

SELF-COOLED MOTOR PROPELLER FANS

With or Without Guards

Solve Most Ventilating Problems
Correctly and Economically

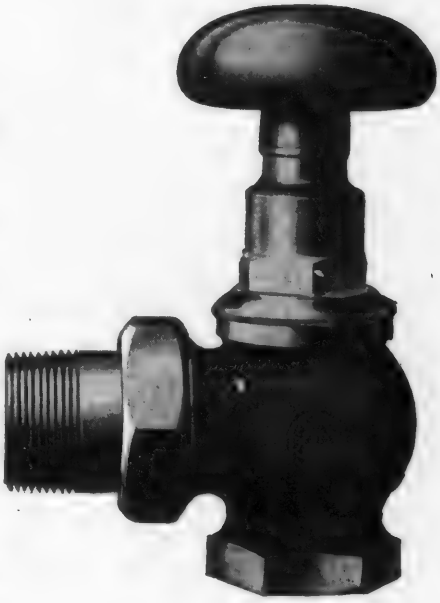
"IF IT'S SELF-COOLED, IT'S AN ILG"

Ilg Electric Ventilating Co.
158 Whiting Street
CHICAGO

BRANCHES ALL CITIES

Please mention THE HEATING AND VENTILATING MAGAZINE *when you write.*

DETROIT PACKLESS RADIATOR VALVES



The Correct Valve for the Beautiful Home

Detroit Packless Valves are finished with the definite purpose, that they shall harmonize with the most beautiful surroundings. In addition to their unusually pleasing appearance and smooth satin finish they are permanently efficient and will not leak or need repacking.

Booklet VP-1 Gladly Sent Upon Request

DETROIT LUBRICATOR COMPANY
DETROIT, U. S. A.
CANADIAN DETROIT LUBRICATOR COMPANY LTD WALKERVILLE, ONTARIO

LARGEST MANUFACTURERS OF RADIATOR VALVES IN THE WORLD

Peoria, Ill.—The State Public Utilities Commission has entered an order permitting the Central Illinois Light Company to change from flat rates to meter rates for steam heating service, commencing September 1. A previous order had named October 1 as the date for the change, but owing to the fact that many patrons wish the service by September 1 the change was granted.

Charleston, Ill.—Strong opposition is developing to the request of the Central Illinois Public Service Company for leave to discontinue its heat franchise in Charlestown. At a mass meeting of patrons of the company it was decided to employ the services of a heating expert to go over the situation and estimate the loss to consumers in the matter of discontinuing the supply of heat, the probable cost of putting the plant in Charleston in good condition, and other matters.

Springfield, Ill.—In order to provide the necessary capital for acquiring the utilities plant in Galena, Ill., and in improving and extending this plant, the Intra-State Light & Power Company, a Delaware corporation, with its principal offices in Wilmington, which now operates the Galena plant, has field a petition with the State Public Utilities Commission asking for authority to issue a promissory note of $777,000 for one year, dated April 1, 1918, to take up the remainder due on promissory notes for $1,000,000, issued April 1, 1917, for one year.

Anderson, Ind.—The plant of the Central Heating Company which, as announced last month, was taken over in February by a co-partnership, consisting of B. W. Bissell, of Indianapolis; George A. Alexander, of Logansport; and A. J. Stahl, of La Porte, was continued after April 15, the original date for the expiration of the agreement. The continued operation of the plant was made necessary by the cool weather. Those in charge have been engaged in compiling data in connection with the operation of the plant, to be used as a basis of computation for the public service commission, in conjunction with the officers of the company, to determine the rates for next season. Before June 1, when the option expires, the present managers expect to purchase the plant at the figure of $63,000 named in the option. If this is done, the plant will be remodeled and many of the mains repaired.

Johnson { Heat / Humidity } Control

Always the Leader in Inventions and Improvements

First: Practical Heat Regulation.

Second: Pneumatic Thermostats.

Third: Humidostats—the first practical apparatus for the control of humidity

Fourth: The "SYLPHON" Metal Diaphragm Valve for heat control, the one thing needed to make heat regulating systems durable and reliable. We tested this valve three years before we offered it for use. Untested imitations and substitutes followed fast, but having been thoroughly tested and proven equal to all demands,

the "SYLPHON" is the Recognized Standard.

Fifth: Unequalled Service in all Departments.

Johnson Service Company

Milwaukee, Wis.

Offices in all Large Cities

Davenport, Ia.—C. H. Myers has left the employ of the Tri-City Railway and Light Companies to accept the management of one of the corporation's subsidiary companies at Iowa City.

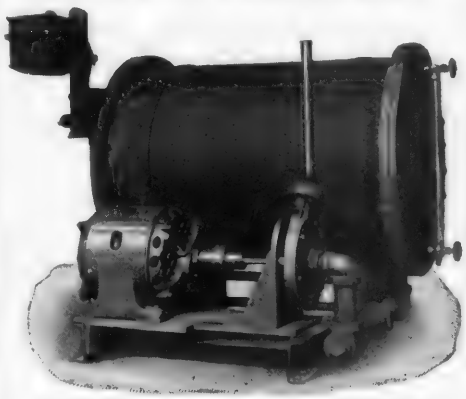
Manufacturers' Notes.

National Tube Co., Pittsburgh, Pa., is planning the construction of an extra ore-carrying bridge at its plant in Lorain, together with the installation of a new power plant. The improvements will involve an expenditure of $500,000.

Ilg Electric Ventilating Co., Chicago, Ill., will shortly begin work on its new building at Elston Avenue and Snow Street, Chicago, which, as announced last month, the company wil build at a cost for the building and land, of $750,000. The plant will occupy a site comprising 214,282 sq. ft. of land, with 325 ft. on Elston Avenue and 710 ft. on Snow Street, extending to the Chicago & Northwestern Railway. A surface storage track will be installed to accommodate 30 cars. This is described as an innovation in factory districts and will greatly facilitate switching service. The

WAR-TIME ECONOMY

demands the use of fuel-saving devices



ARCHITECTS AND ENGINEERS

designing new plants generally provide for economical equipment, but there are many existing low pressure steam heating plants where a surprising amount of fuel could be saved by the installation of

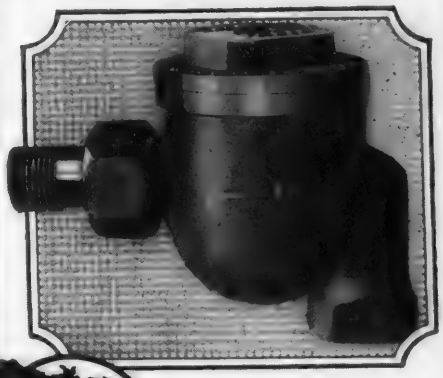
Yeomans Electrically Operated Condensation Return Pumps

Made in Horizontal and Vertical Types for automatic operation

Send for Bulletin C-5000. Agents in all principal cities.

YEOMANS BROTHERS CO.

223 Institute Pl. Chicago, Ills.



JOHNS-MANVILLE SERVICE COVERS THE CONTINENT

Johns-Manville Radiator Trap

Some day when your foreman calls you up

—and tells you that he trapped fifty radiators in jig time and that they're all working—you can believe him if he used Johns-Manville Radiator Traps.

And here's why: He sets up the radiators, blows off the system, drops the balls in place, screws on the caps and the job is done.

For there are ro intricate adjustments, no setting of springs or levers or thermostatic parts—nothing to get out of order.

The Johns-Manville Radiator Trap will take care of condersatior from any radiator having a heating surface of 250 square feet or less.

It's total cost is less than others. Send for the Special Bulletin that points the way round trap troubles.

H. W. Johns-Manville Co.

New York City

10 Factories—Branches in 61 large Cities

building being erected by the company is of fireproof construction, four stories high. It will be built in units of 300x60 ft., connected by passageways and 80-ft. light courts. Special attention is being given to the accommodations for the employees, including rest-rooms and shower-baths, gymnasium, company dining-room and club-room. The rapid growth of the Ilg Company has necessitated several increases in its quarters during the last few years. The company moved from small quarters on East Kinzie Street in 1910 to its present building on Whiting Street and erected Building "A" at the present plant. Building "B" of the present plant was erected in 1915, and in 1917, building "C" was added. The company is one of the pioneers in sharing profits with its employees, so that many of the older employees are prominent stockholders in the company.

H. W. Johns-Manville Co., New York, announces the removal of its office in Youngstown, Ohio, to 520 Market Street. The Memphis, Tenn., office has been moved into new quarters at 804-805 Exchange Building, Madison Avenue and Second Street, Memphis.

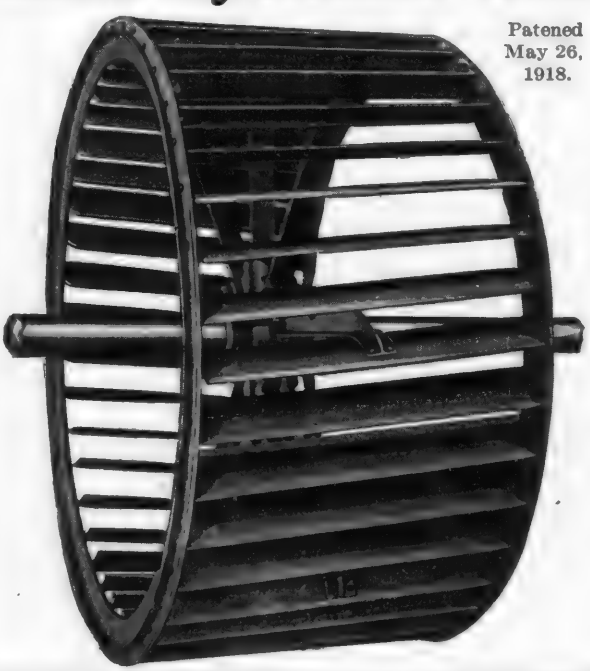
American District Steam Co., North Tonawanda, N. Y., has elected G. C. St. John president of the company, succeeding W. H. Wells. The other officers elected are: Vice-president, H. J. Babcock; secretary and general manager, Charles R. Bishop; treasurer, Robert Hall. Mr. St. John was formerly vice-president of the company and Mr. Babcock was formerly chief engineer.

H. W. Johns-Manville Co., New York, announces that for the better service of the shipbuilding and allied interests in Tacoma, Wash., as well as the constantly-increasing number of manufacturing plants, a new branch of the company has been opened in Tacoma at 1015 A Street. The branch will carry a complete stock of asbestos packings, molded and in sheet form, and other Johns-Manville power plant specialities.

Hawes Foundry & Equipment Co., New York, with a capitalization of $250,000, announces the recent acquisition of the Central Bronze Company which will co-operate with the Hawes company's other plants in turning out a complete line of bronze valves and fittings used in connection with steam engineering, industral and shipbuilding work. The company's products will be

THIS IS WHAT WE HAVE BEEN "BLOWING" ABOUT!

THE NEW IMPROVED **Cycloidal Multivane Wheel**



Patened May 26, 1918.

For Heating and Ventilating

The vanes are curved forward, and set at an angle to the shaft, (patented feature) allowing uniform, unrestricted flow of air across entire width of wheel.

Highest Efficiency

Noiseless and Durable

Write for further details

Garden City Fan Co.

Est. 1879

CHICAGO, ILL.

Eastern Representatives:
L. J. WING MFG. CO., New York

In World's Finest Newspaper Plant

Two complete units of Sirocco Air Purifying Systems are serving in the new home of the Detroit News—undoubtedly the most modern newspaper plant in existence.

The top illustration at the left shows one of the two Sirocco Fan Outfits. The lower illustration shows one of the two Sirocco Air Purifying Systems.

It was our privilege to co-operate with Architect Albert Kahn, of Detroit, and the General Contractors, George A. Fuller Co., of Detroit, in the application of this Sirocco Equipment.

Our Engineering Department is glad to co-operate with Architects, Engineers and Contractors in connection with Sirocco application.

American Blower Co.

Detroit, Michigan

Branches in all Large Cities

Canadian Sirocco Co., Ltd.
Windsor, Ont.
Manufacturers for Canada

marketed and distributed, as in the past, through its principals, the John Wilfert Co., New York, Brooklyn, St. Louis and Buenos Ayres.

International Heater Co., Utica, N. Y., held a convention of its salesmen at the company's plant in Utica, March 12-14. Eight-seven representatives of the company were present. At the dinner which concluded the convention, service pins were presented to those who had been in the company's employ for five years or more. President F. E. Wheeler acted as toastmaster, and the speakers included Vice-President Russel Wheeler, Treasurer Irving L. Jones, Director W. T. Baker; also D. E. McCabe, manager of the Western branch; C. M. Lyman, Eastern sales manager; and George A. Tyler.

Clarage Fan Co., Kalamazoo, Mich., announces the removal of its Chicago branch to the Conway Building, Room 1666, 111 West Washington Street. Gardner I. Thomas is manager of the Chicago office.

New Incorporations.

Sanitary Engineering Co., Charlevoix, Mich., capital $5,000, to conduct a heating, plumbing and sheet metal business.

Vulcan Sheet Metal & Mfg. Co., Inc., 45 Fulton St., New York, has been organized to conduct a contracting business in sheet metal work of all kinds. The officers, who are well known in the heating trade, include C. A. Quirk, mechanical engineer for Howard & Morse, fan manufacturers, New York. Mr. Quirk is general manager and vice-president of the new concern. He is a member of The American Society of Heating and Ventilating Engineers. The company already has a number of contracts on hand.

Staggard Radiator Co., Los Angeles, Cal., organized to manufacture "honeycomb" radiators, the invention of Horace A. Cureton, of Los Angeles, who is the principal stockholder of the company.

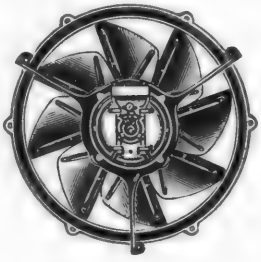
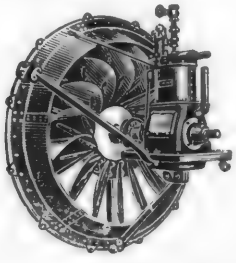
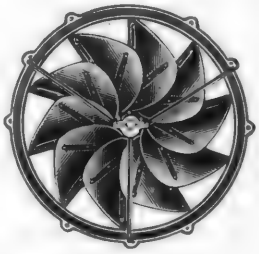
New Firms and Business Changes.

Uniform Heater Co., Chicago, Ill., has increased its capital stock from $50,000 to $100,000.

JAMES M. SEYMOUR

NEWARK - NEW JERSEY - U. S. A.

ELECTRIC DRIVEN STEAM DRIVEN BELT DRIVEN

Send for Bulletin No. 121, Jan. 1917

SEYMOUR FANS are the most durable and efficient air moving machines to be had in this country. Built in seven styles and fifteen sizes, 18-inch to 168-inch fans in stock. Capacity 1000 cubic feet to 150,000 cubic feet per minute.

Ventilating systems to suit all conditions. **Dust Collectors, Humidifiers, Dry-Rooms** to dry anything from bricks to sponges.

AIR CONDITIONING

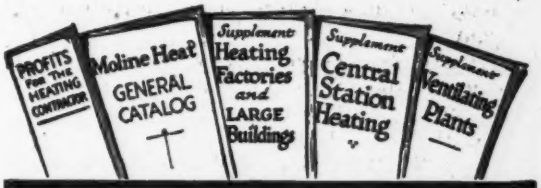
JAMES M. SEYMOUR, 5-7-9-11-15-17-19 Kirk Place, NEWARK, N. J.

James R. McMann, formerly of McMann & Taylor, New York, has engaged in business, under his own name, as a dealer in pipe, fittings and steam supplies. Quarters have been opened at 56-60 Gold Street, New York. Mr. McMann will have as associates Harry Mulliken, formerly with McMann & Taylor for many years, and Philip Spiro, formerly manager of McMann & Taylor's export department.

Chas. S. Wood & Co., Newark, N. J., has been established at 9-177 Alling Street to engage in the pipe-covering business. The firm will also handle a full line of asbestos materials, and is prepared to take general pipe-covering contracts. Charles S. Wood, who is at the head of the firm, is well-known to the Newark trade having acted for many years as representative in that locality for the Keasbey & Mattison Co., New York.

"Official Bulletin" the Government's Information Journal.

Owing to the enormous increase of Government war work, the departments at Washington are being flooded with letters of inquiry on every conceivable subject concerning the war. It has been found a physical impossibility for the clerks—though they number an army in themselves now—to give



THESE VALUABLE BOOKS *FREE!*

Each one is worth big money to you. Every heating contractor should have them. They cover all the latest money-making ideas in figuring and installing steam heat—hot water heat—vapor heat—and vacuum systems.

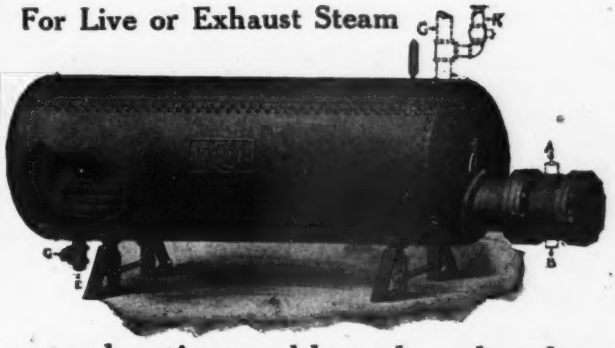
These books will help you to land more orders and increase your profit on every job. Write for them at once. They are absolutely *FREE!*

Moline Illinois

Sims Clean E-Z Steam Tube Heater

For Hotels, Apartment Buildings, Hospitals, Y. M. C. A. Buildings Schools, etc.

For Live or Exhaust Steam



requiring large quantities of hot water. This type of heater should be used in preference to circulating generator and storage tank—or instantaneous heaters.

Special attention given to all kinds of water heating problems based on long experience in this work.

Valuable tables have been prepared, showing heater capacities using steam at various pressures. These tables are yours for the asking.

THE SIMS CO., 18th St., Erie, Pa.

many of these letters proper attention and reply.

There is published daily at Washington, under authority of and by direction of the President, a government newspaper—the Official Bulletin. This paper prints, every day, all of the more important rulings, decisions, regulations, proclamations, orders, etc., as they are promulgated by the several departments and the many special committees and agencies now in operation at the national capital. This official journal is posted each day in every post office in the United States —more than 56,000 in number—and may also be found on file at all libraries, boards of trade and chambers of commerce, the offices of mayors and governors and federal officials. By consulting these files most questions will be found readily answered.

The Official Bulletin is published daily by the Committee on Public Information, 10 Jackson Place, Washington, D. C. (price $5 per year). Subscriptions for these publications should be sent direct to the offices in question, and not to the War Trade Board.

Time is Money; Then Charge For It.

Under the heading of "Time is Money; Then Charge for It," the *Sanitary Engineer* of Toronto, Canada, urges that sanitary and heating contractors should charge for their time and advice given, whether or not they are awarded the contract for the subsequent work done.

A typical instance is cited where a heating contractor received the following letter from a house owner:

"Dear Sir: About four years ago we had our present hot-water heating system installed. It worked fairly well for two winters but since then has not given anything like the satisfaction it did at first. Would you please call at the above address and give me your idea as to what is wrong and what in your opinion should be done to remedy matters."

The writer goes on to state that the contractor made the investigation requested and found, among other things, that the heater was inadequate in capacity, that the heater and piping were not covered, so that a larger boiler was needed. It transpired that two 50 sq. ft. radiators had been added not long before to heat a large sunroom. The contractor recommended the installation of a larger heater. This, however, did not satisfy the owner and he called in another heating man.

To cover such cases the writer proposes that a charge should be made for such a report and suggests that a paragraph similar

THE ⌐¬ SHAPE TUBES EXPLAIN THE SUCCESS
of the
PATTERSON HOT WATER TANK

for heating water for domestic or manufacturing purposes. Both ends of each seamless brass tube are expanded into heavy cast-iron tube-heads with an improved roller expander. Their shape provides for the free contraction and expansion of each individual tube without straining, so there is no danger of leakage.

Type C. Patented Aug. 26, 1913.

Any Combination of Storage and Heating Capacities can be Furnished.
Send for Catalogue.

PATTERSON - KELLEY CO., 23 Dye Street, New York
Representatives in all Principal Cities.

Saving Coal

We have been "fuel conservation specialists" for thirty years. During this period we have been directly interested in more than 11,000 successful heating systems and over 7,000 power plants, in which the aggregate saving of fuel may be stated in hundreds of thousands of tons yearly.

If you are operating your engines under back-pressure, or if you are having difficulty in circulating steam for heating, you are wasting steam, which means increased fuel consumption. These difficulties can be remedied. Let us show you how to SAVE ENGINE POWER by the removal of back-pressure, thereby increasing the efficiency of the heating system by better circulation, and eliminating water-hammer, air-binding and other objectionable features.

If you are interested in a heating system or a feed water heater for an industrial plant, hotel, office building, in fact—any building of fair size—an investigation of your present installation and operating conditions may lead to economies which cannot and should not be overlooked.

We are at your service with a trained engineering organization and branch offices in thirty cities. We have made fuel conservation a life-study and can determine and report candidly whether improvements are justified by assured results.

Write us for further information. No charge—and no obligation—for preliminary advice.

Address Department G-37

WARREN WEBSTER & CO.

Camden, New Jersey

Fuel Conservation Specialists Since 1888

to the following be added to the contractor's report to a house owner:

"Enclosed please find my charges for report which will be deducted from the contract price, if accepted."

Plea for Industrial Unity by United States Chamber of Commerce.

Pointing out the essential importance of avoiding industrial disputes during war, the committee on industrial relations of the Chamber of Commerce of the United States sets out the progress that is being made toward a plan for assuring maximum production on the part of the Untted States. The committee points out that the difficulties of obtaining war materials have been increased by questions of wages, of hours and conditions of labor, of transportation for workers,

Fourteen 600-H. P. Machines

One Shipment

Draining heated apparatus and feeding the condensate directly into boilers at temperatures over 300° in some instances

Send for our catalogue showing 12 types of machines and 25 system designs

FARNSWORTH CO.

Conshocken, Pa.

and of housing, each of them of the highest importance to the maintenance of vital production.

"Industrial relations are the very hinge-joint of the war in which we are engaged," says the committee.

The constructive plans suggested by the committee insure industrial peace and efficiency include agreements that there shall be no cessation of production, that these agreements be supported and enforced by executive authority, that there shall be control of causes leading to unrest, and that there shall be provision for conclusive arbitral decisions regarding differences that arise in spite of preventive measures. The committee takes the ground that no plan should be considered which does not first prevent excessive profits resulting from the conditions of war. It is necessary to permit a reasonable profit to stimulate the increase of production on the part of industry. Anything in excess of that should be either prevented or taken by the government. The Government should at the same time endeavor to prevent excessive prices which employes pay for the necessaries of life.

"Unusual Business, Not Business as Usual" is the title of a timely pamphlet written by Harold G. Moulton, of Chicago, and pubblished by the Union League Club of that city. The pamphlet takes up the industrial adjustments to be made in the coming months to insure the production of "the perfectly stupendous quantities of supplies and war materials that war imperatively demands." Some idea of what the government is planning in this connection is given, the writer stating that "the government of the United States is now full aware of the necessity of such industrial mobilization."

Braemer

Air Conditioning Corporation

Air Purifying—Air Cooling—Humidifying—Dehumidifying—Industrial Ventilation—High and Low Temperature Drying—Generator Coolers—Dust Removal—Reclamation.

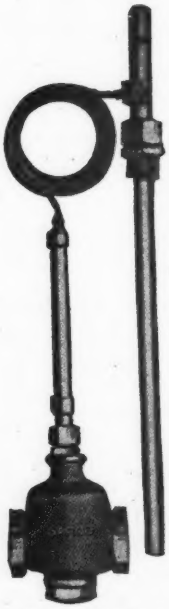
Webster Air Washers

LAFAYETTE BLDG.
PHILADELPHIA

TEMPERATURE REGULATOR

SARCO

As Accurate in Regulating as a Thermometer is in Registering



Sarco Temperature Regulator for Tanks, Containers, etc.

You wouldn't think of *telling* temperature by hand. Then why *regulate* temperature by hand?

You use a dependable thermometer for telling temperatures. For controlling them you should use an accurate automatic regulator like the Sarco.

The Sarco utilizes the same unvarying principle as is employed in the thermometer—that of the expansion and contraction of a liquid. But it goes the thermometer one better. It does things instead of tells them. And it does them without auxiliary apparatus, outside motive force or fuss.

SARCO COMPANY, Inc.

Woolworth Building, New York City

Ellicott Square, Buffalo New Telegraph Bldg., Detroit
Williamson Bldg., Cleveland Monadnock Block, Chicago
Drexel Building, Philadelphia

Representatives in all principal cities

Canada, Peacock Brothers, Montreal